

ART. XXXI.—*Material for a Monograph on the Diptera Fauna of New Zealand: Part II, Family Syrphidae.**

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Plates XLVII–LII.

OWING to the fact that some four years ago the greater part of my collection of New Zealand Diptera was accidentally destroyed, I have not until recently had sufficient material at my disposal upon which to publish a regular series. It has in four years been possible, however, to get together a collection very nearly as complete as the original one, which represented the work of ten years, such rapid reconstruction being for the most part due to those able entomologists Mr. G. V. Hudson, of Wellington, Mr. E. Clarke, of Dunedin, Mr. J. R. Harris, of Ohakune, and Mr. J. W. Campbell, of Christchurch, who have generously presented extensive collections from various parts of the Dominion, not only replacing many of the species destroyed, but also bringing to light many new forms. The preparation of this paper was also simplified by the kindness of Mr. R. Speight and Mr. G. Archey, of the Canterbury Museum, in placing at my disposal the late Captain Hutton's types of New Zealand Diptera. The invaluable photographic illustrations are the excellent work of Mr. E. B. Levy, of the Government Biological Laboratories.

Since the publication of Part I, which dealt in part with the Stratiomyidae, further representatives of that family have been obtained and will eventually appear as a supplement to Part I.

The Syrphidae may be characterized as follows: Eyes moderately or densely pilose, sparsely haired or bare, those of the male holoptic at a point or more completely, or dichoptic, in which case they may be very much approximated or more widely separated; when dichoptic the frontal orbits may be parallel on upper half but divergent on lower, being thus angulated (fig. 68); in many cases there is a transverse furrow on the front connecting the orbital angulation. In profile the eyes may descend almost to the oral margin, thus practically eliminating the cheeks, or be much shorter, while in some cases they are comparatively small. The ocellar triangle is of varying shapes and sizes, sometimes, for example, being more or less round and reaching from eye to eye, or long and triangular reaching well on to the front; the ocelli well developed. Front varying in width according to sex, clothed with pile, with longer or shorter dense or scattered hairs, or altogether bare; it may be smooth, transversely wrinkled, or grooved medio-longitudinally. Antennae shorter or longer, the 3rd joint oval or orbicular (fig. 14); more or less rectangular, or elongate (fig. 6); arista dorsal in the known New Zealand species, bare

* Part I in *Trans. N.Z. Inst.*, vol. 49, p. 172 (1917).

or pubescent (hairy in some exotic species). Face of varying shape; concave (fig. 48), convex, arched (fig. 5), or vertical (fig. 7) below antennae, with (fig. 15) or without (fig. 52) a central tubercle or swelling; sometimes produced at oral margin (fig. 52); clothed with hairs or bare, and sometimes transversely wrinkled; oral margin horizontal, descending (fig. 63) or ascending (fig. 5); cheeks more or less well developed and usually clothed with hairs. The proboscis well developed, the labella larger or smaller; the palpi slender or stouter.

Thorax usually robust, sparsely or densely clothed with long or short hairs or with pile, or altogether bare; scutellum crescentic or quadrangular, sometimes tuberculate, clothed or bare. Legs well developed, slender or stout, the posterior femora sometimes thickened and with a swelling or a tooth-like process below toward apex or base; the tibiae and tarsi sometimes broadened and peculiarly developed; the legs sometimes clothed with longer or shorter hairs and less commonly with bristles which are most frequent on underside of the posterior femora, on the tarsi, and abdomen, particularly on the genital segments of the male; claws and pulvilli small or well developed, the empodium bristle-like or styliform.

The wings usually longer than the abdomen, in some cases shorter; incumbent when at rest or held slightly divergent just exposing the abdomen. The wings vary somewhat in outline, being apically pointed

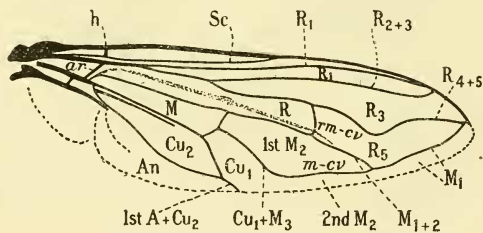


FIG. 1.—Diagram of a syrphid wing, showing venation.

or blunt, while the anal angle is evenly rounded or strongly developed; the alula is usually short, but may be long and narrow, reaching almost to the posterior margin of the wing (fig. 2); the squamae and anti-squamae are well developed and fringed with hairs, those on the former being long and frequently branched, and on the latter short. In colour the wings are either clear or tinged over the whole or part of the membrane, the base and cell Sc being more deeply coloured. The venation (fig. 1), which is distinct and readily characterizes the family, presents some interesting peculiarities. The costa ends at its junction with vein R_{4+5} either at or before the apex of the wing; sometimes there is a supernumerary humeral vein present; in some cases Sc_2 is developed, uniting as a cross-vein, Sc_1 with R_1 near the apex of the former; vein R_{2+3} runs more or less straight, or is strongly curved upward and sometimes slightly backward at its apex to meet the costa or to unite with vein R_1 , thus closing cell R_1 ; vein R_{4+5} is straight, slightly curved downward, or deeply looped into cell R_5 , which is always closed apically either on, near, or considerably before the costa by the confluence of

R_{4+5} and M_1 , the latter running almost parallel with the wing-margin; basally cell R_5 is closed by the cross-vein $r-m$, which is more or less oblique, longer or shorter, and situated before, near, at, or beyond the middle of cell 1st M_2 . Intersecting the lower part of the cross-vein $r-m$ and running through cell R to end in cell R_5 close to the vein M_{1+2} is a more or less developed—though sometimes absent—spurious vein characteristic of the family: this is the *vena spuria*. Basally the *vena spuria* may be evanescent, but otherwise arises from the origin of vein R_{2+3} usually in those forms where the cross-vein $r-m$ lies before the middle of cell 1st M_2 , or, where this cross-vein is beyond the middle of cell 1st M_2 , the spurious vein originates from the vein M where the latter curves downward to meet vein Cu at the base of the wing. A little before $r-m$ in cell R the *vena spuria* is swollen knob-like, from whence a vein-like stump may descend either to evanesce or unite with vein M , or a spurious cross-vein may connect the *vena spuria* above with the vein R_{4+5} near the origin of the latter, which is then somewhat angulated at this point. The vein M , just beneath the swelling of the *vena spuria* and behind the cell 1st M_2 , is frequently sinuated; from the origin of this sinuation in some species (fig. 27) an indistinct vein arises perpendicularly into cell M and turns abruptly forward, crossing into cell 1st M_2 . The veins M_1 and M_2 are united for the greater part of their length, branching near the wing-margin, the anterior branch, M_1 , closing the cell R_5 as already noted; M_2 may either continue beyond the fork or be confluent with M_1 , which in some cases is angulated, giving rise to a short stump into cell R_5 (fig. 22). Connecting the veins M and Cu_1+M_3 is the cross-vein m running more or less parallel with the wing-margin and meeting vein M either before the branching of M_1 in such forms where M_2 is continued toward the margin, or at the fork of M_1 where M_2 is confluent with M_1 . As with vein M_2 , the vein Cu_1+M_3 is either confluent with the cross-vein m or is continued beyond toward the margin; owing to the fusion of the veins Cu_1 and M_3 , the cross-vein $m-cu$ is eliminated. After the confluence of Cu_2 and 1st A , $Cu_2 + 1st A$ either runs straight to the margin or is more or less prolonged and curved. In cell Cu_2 of most species is a distinctly developed vein arising at the origin of 1st A and, running close to vein Cu , ending beyond the middle of the cell. The basal "vein" of the alula is connected with the origin of Cu by a distinct cross-vein and the arculus between Cu and R , or M and R , is well developed.

According to the venation, the species discussed below form three groups. In the first (Plate XLVII, fig. 6) the costa ends with vein R_{4+5} at the apex of the wing, which is more or less blunt; the vein R_{4+5} is practically straight above cell R_5 , and the veins Cu_1+M_3 and M_2 are more or less developed beyond the cross-vein m and the vein M_1 respectively; also the cross-vein $r-m$ is before the middle of cell 1st M_2 (Syrphinae). In the second group (figs. 3 and 4), the costa ends before the apex of the wing, which is more or less pointed; the vein R_{4+5} is gently curved into cell R_5 , the veins Cu_1+M_3 and M_2 are confluent with the cross-vein m and the vein M_1 respectively, and the cross-vein $r-m$ is near or beyond the middle of cell 1st M_2 (Milesiinae). In the third group (fig. 1) the costa ends distinctly before the apex of the wing, which is pointed; the vein R_{4+5} is deeply curved into cell R_5 ; the veins Cu_1+M_3 and M_2 as the second group; the cross-vein $r-m$ beyond the middle of cell 1st M_2 . A further reduction occurs in this group (Plate LI, fig. 3) in the closing of the cell R_1 of some species by the confluence of veins R_1 and R_{2+3} (Eristalinae).

The abdomen is ovate (particularly in some females), elongate and narrow with parallel sides, or sides converging basally or along the middle, or rectangular; bare, or sparsely or densely clothed with hair, or sometimes with bristles to a certain extent. In the New Zealand species there are 4 visible segments in the male and 5 in the female; in the male segments 5-9 are curved to one side beneath the apex of the abdomen; in the female the apical segments are usually retracted within the 5th, but may be extruded to some considerable length.

The colours of the Syrphidae are frequently more intense in warmer parts of the Dominion and are usually conspicuous. Although a few are melanoid, many are brilliantly metallic, or black with yellow or white spots and stripes; there are also reflections of various hues caused by tomentum or the arrangement of the vestiture. On account of the structure, the flower-frequenting habit, and the mode of flight, many syrphids closely resemble certain Hymenoptera: the European narcissus-fly (*Merodon equestris* Fabr.), sometimes found in New Zealand, bears a strong resemblance to a bumble-bee, while the European drone-fly (*Eristalis tenax* Linn.), now well established in this country, is frequently mistaken for the honey-bee. The absence of indigenous Apidae may account for the absence among New Zealand syrphids of those densely-haired and bee-like species. It is also noteworthy that the native bees are all of the short-tongued group, and that there is an amount of resemblance between these insects and certain native syrphids: for example, *Lepidomyia decessum* Hutton is superficially similar to the native *Halictus huttoni* Cam.*

In the following pages some thirty-three species are recorded, three of which are of European origin, one is found also in Australia, and the remainder are indigenous; of these, fourteen are new species. As in Part I, the terms *pro-*, *epi-*, *meso-*, *meta-*, and *onycho-tarsus* are used for the 1st to 5th tarsal joints respectively, as suggested by Williston. Unless otherwise stated, the term "front" refers to the front and vertex.

TABLE OF GENERA.†

1	{ Cross-vein <i>r-m</i> before middle of cell 1st M_2	2
	{ Cross-vein <i>r-m</i> at or beyond middle of cell 1st M_2	9

Subfam. SYRPHINAE.

	{ Species with yellow markings on face or abdomen, or both	3
2	{ Species without yellow markings, but with greyish tomentose areas or white spots on abdomen	6
3	{ Face distinctly convex and produced at knob and mouth (fig. 5) <i>Paragus</i>	4
	{ Face not produced, but vertical or slightly concave	4

* An account of the economic aspect of this family, "Economic Bearing of Hover-flies," is given by the author in *N.Z. Jour. Agric.*, vol. 17, No. 3, pp. 129-35 (1918).

† SPECIES LIKELY TO BE CONFUSED.

- { *Paragus pseudo-ropalus* n. sp. (Plate LI, fig. 1; and text-figs. 5, 12.)
- { *Syrphus ropalus* Walk. (Text-fig. 37.)
- { *Myiatria campbelli* n. sp. (Plate LI, fig. 1; and text-figs. 80, 84, 86.)
- { *Helophilus cargilli* Miller. (Text-figs. 75, 82.)
- { *Heliophilus antipodus* Schiner. (Plate L, figs. 1, 4; and text-figs. 63, 66, 70-73.)
- { *Helophilus trilineatus* Fabr. (Text-figs. 74, 76, 77, 79.)
- { *Helophilus campbellicus* Hutton.
- { *Helophilus chathamensis* Hutton.
- { *Cheilosia cunninghami* n. sp.
- { *Xylota montana* n. sp.
- { *Lepidomyia decessum* Hutton.

4	{	Pleurae altogether yellow; apex of wing clouded; abdomen of ♂ somewhat spatulate, being narrowed towards base (fig. 13)	<i>Sphaerophoria.</i>
		Pleurae partially yellow or without markings; apex of wing not clouded; abdomen of ♂ not spatulate, the sides parallel or restricted in middle	5
5	{	Face yellow or grey with black markings; abdominal spots linear if present	<i>Syrphus.</i>
		Face black; abdominal spots broad or clavate	<i>Melanostoma.</i>
6	{	Abdomen broad and ovate; face vertical, produced only at oral margin (fig. 7); 3rd antennal joint elongate (fig. 6); posterior femora broad and bristly beneath; eyes haired..	<i>Lepidomyia.</i>
		Abdomen narrow or rectangular; face not vertical to oral margin but with a distinct knob in middle; eyes bare ..	7
7	{	Legs normal	<i>Melanostoma.</i>
		Legs peculiarly haired (fig. 16); posterior tibiae and protarsi enlarged, or anterior tibiae and tarsi broadened (fig. 45) ..	8
8	{	Rather robust flies; head more or less distinctly rectangular; face vertical or produced slightly forward; antennae lying flat on face (figs. 15, 18, 19, and 20)	<i>Cheilosia.</i>
		Rather slender flies; head not distinctly rectangular; face concave if anything; antennae not flat on face	<i>Platycyirus.</i>
9	{	Vein R_{4+5} deeply looped into cell R_5	10
		Vein R_{4+5} moderately or slightly looped	14

Subfam. ERISTALINAE.

10	{	Cell R_1 closed	<i>Eristalis.</i>
		Cell R_1 open	11
11	{	Posterior femora with an extraordinarily large triangular tooth near apex below; vein M_1 strongly curved to meet R_{4+5} a considerable distance from costa	<i>Merodon.</i>
		Posterior femora without triangular process, at most with bristly swelling; vein M_1 meeting R_{4+5} on or near costa	12
12	{	Eyes hairy	<i>Myiatropa.</i>
		Eyes bare	13
13	{	Eyes dichoptic in both sexes; thorax moderately or indistinctly haired; scutellum normal	<i>Helophilus.</i>
		Eyes of ♂ holoptic; thorax densely haired; scutellum with a pair of tubercles	<i>Mallota.</i>

Subfam. MILESIINAE.

14	{	Cross-vein $r-m$ beyond middle of cell 1st M_2 ; thorax striped; abdomen with hoary spots; posterior femora moderately thickened	<i>Tropidia.</i>
		Cross-vein $r-m$ at middle of cell 1st M_2 ; posterior femora strongly thickened	15
15	{	Abdomen with yellow spots	<i>Syrpitta.</i>
		Abdomen immaculate	<i>Xylota.</i>

Subfamily SYRPHINAE.

Cross-vein $r-m$ distinctly before middle of cell 1st M_2 ; vein R_{4+5} not curved into cell R_5 but more or less straight; cell R_1 open.

Genus PARAGUS Latreille (1805).

The outstanding character of this genus is the arched face; the eyes of the male are holoptic, those of the female dichoptic.

P. pseudo-ropalus n. sp. (Plate LII, fig. 1)

A medium-sized fly with yellow face and scutellum, a pair of yellow spots on the 2nd and 5th, and a broad yellow band on the 3rd and 4th abdominal segments (fig. 12). This species is named *pseudo-ropalus* owing to its superficial resemblance to *Syrphus ropalus* Walk.; the two species may be distinguished by the shape of the face, which is arched in the former (fig. 5) and vertical in the latter (compare also figs. 12 and 37).

♂. Eyes bare, holoptic for a short distance in front of ocellar triangle, which is black with black hairs; ocelli brick-red. Front ochreous with scattered black hairs which extend on to face on each side; lunular area brownish; orbital margins narrowly blackish-brown. In profile the head is rather flat above to where the front descends to the antennae, which are somewhat elongate and sometimes surrounded with orange-yellow at the base; 1st and 2nd joints brownish and short; 3rd joint reddish-brown or yellow and elongate oval; arista brown and pubescent. Face thinly clothed with erect short black hairs; face pale yellow with a greenish tinge and a median blackish-brown stripe on lower half to oral margin, which is margined with blackish-brown; in profile the face is arched and produced at the knob (fig. 5); occiput black; proboscis and palpi brownish-black.

Thorax shiny black, clothed with short pale hairs; a tawny spot clothed with tawny hairs on each side of dorsum anterior to wing-articulation; scutellum testaceous and clothed with testaceous hairs; halteres testaceous. Wings faintly tinged; the veins and stigma blackish-brown. Legs testaceous but paler at the knees and basal half of tibiae; tarsi, particularly the posterior, fuscous.

Abdomen elongate, comparatively broad at the base, and somewhat narrowing between the 3rd and 4th segments; black, but to a great extent occupied by a pair of testaceous spots on the 2nd segment, a smaller pair on the 5th, and by two broad testaceous bands, one across the 3rd segment and the other across the 4th (fig. 12); genital segments blackish-brown except the 9th, which is tawny; 6th, 7th, and 8th clothed with scattered delicate hairs.

♂. Length, 8 mm.

Holotype: ♂, No. 1231, D. M

Habitat.—Dunedin.

Genus LEPIDOMYIA Loew (1864).

The following species was originally described by Hutton as a *Melanostoma*, but it clearly does not belong to that genus, from which it is distinguished by the following features: Body robust, immaculate and hairy; antennae elongate; eyes densely haired; face tuberculate at oral margin; posterior femora thickened and bristly below; posterior tibiae broadened apically and their protarsi somewhat thickened.

L. decessum. (Plate XLVII, figs. 1, 2.)

Melanostoma decessum Hutton, *Trans. N.Z. Inst.*, vol. 33, p. 43 (1901).

A shiny blue-black robust fly with the abdomen ovate and no colour-pattern.

♀. Eyes clothed with short whitish hairs; front angulated at a transverse central depression, shiny blue-black and densely clothed with short brownish hairs; lower frontal orbits silvery in certain lights. Antennae (fig. 6) black, with a lighter reflection; 3rd joint elongate, reaching well down the face, which is vertical in profile and tuberculate at oral margin (fig. 7). Face shiny blue-black, covered with a silvery tomentum; a silvery pubescence along facial orbits; cheeks black and clothed with silvery hairs; proboscis and palpi brownish-black.

Thorax and scutellum shiny blue-black with a greenish tinge, and clothed with a scattered white pubescence which becomes longer on the pleurae and is replaced by long hairs around the coxae; 2 areas of short white hairs on anterior margin of dorsum just posterior to the head; scutellum with

a marginal fringe of scattered black hairs ; spiracles silvery ; halteres orange-yellow or orange-red. Wings clear, stigma brownish, veins blackish-brown ; R_{4+5} running straight between cells R_3 and R_5 ; cross-vein $r-m$ a little shorter than its distance from base of cell 1st M_2 . Legs hairy, the femora somewhat thickened, the posterior particularly so ; femora blue-black with greyish hairs, the posterior pair with numerous short bristles on lower side near apex ; knees brownish-yellow ; tibiae brownish-yellow darkening apically, the posterior pair darker and broader distally, all clothed with stiff greyish hairs longer on the posterior pair, which have a stiff golden pile below toward the apex ; tarsi brownish becoming black apically, and clothed with stiff silvery hairs ; posterior protarsi rather swollen and with a short golden brush beneath.

Abdomen shiny blue-black, immaculate, ovate, being broader than the thorax, and usually carried with the apical half turned downwards ; clothed with short and scattered greyish hairs, but 1st segment with longer ones on each side.

♂. Eyes densely hairy, and holoptic over the greater part of the front ; thorax and scutellum more densely and longer haired than the female ; posterior tibiae silvery below toward apex, in some lights ; posterior femora clothed with long erect bristle-like black hairs distally ; abdomen black, slightly brown in recently emerged specimens, more hairy than female, the hairs black. Genitalia black ; the genital segments, except the 9th, clothed with delicate hair-like bristles ; claspers long and bifid (fig. 8).

This species, when on the wing, closely resembles the native bee (*Halictus huttoni* Cam.).

Larva.—The larva is of the rat-tailed type, but the siphon is short (Plate XLVII, fig. 3) ; the body, which is creamy-white, may attain a length of 20 mm. including the siphon ; the transparent integument is transversely corrugated, and clothed with short bristles very minute on ventral surface, which otherwise is clothed with delicate hairs ; along each side the integument is further broken up by longitudinal folds upon which the bristles are longer and more hair-like ; from the lateral margin of each segment arises a tuft of 2 or 3 divergent bristle-like hairs which are distinctly longer than the surrounding vestiture and most conspicuous on the terminal segments, though absent on the ultimate segment, which is frequently withdrawn. The "prolegs," which are armed with strongly recurved spines, vary in shape according to the contraction or expansion of the segments, being prominent knob-like swellings or merely transverse ridges of the integument. A characteristic feature is the form of the anterior segment, which is longitudinally fluted on the dorsal surface (fig. 9) when the anterior margin is contracted by being drawn around the oral cavity, much in the same way as the mouth of a pouch is drawn together by strings ; if fully expanded this segment is truncated and the flutings indistinct. The anterior respiratory processes are trumpet-shaped and short ; posteriorly the body tapers and the posterior angles of the penultimate segment are produced and carry the tuft of 3 bristle-like hairs characteristic of the body segments. The siphon is short, the tracheal opening being fringed by tufts of long and recurrent setose hairs (fig. 11).

Pupa (Plate XLVII, figs. 4, 5).—The pupa is brown in colour, the hard cuticle being transversely rugose and bearing the lateral hair-tufts of the larva ; in outline it is club-shaped, being strongly arched dorsally and tapering posteriorly to the respiratory siphon ; the ventral surface is flat. Length, 10 mm. ; greatest breadth, 4 mm.

Habitat.—*L. decessum* is found throughout New Zealand, and occurs on the wing from September to May; it is most prevalent in the vicinity of flax-bushes (*Phormium tenax*) and cabbage-trees (*Cordyline australis*), which are the breeding-grounds of the larvae. All larval stages are to be found at the one time inhabiting the gum-fluid retained in the leaf-sheaths of *P. tenax*; the larval period, particularly during the colder months, is of considerable duration. Pupation occurs upon the dead flax-leaves, to which the pupae adhere; they are partially or completely covered by a white precipitate from the gum-fluid. Mr. G. V. Hudson* has found the larvae of this fly breeding in decaying matter under the bark of cabbage-trees.

♂ and ♀. Length, 7 mm.

Holotypes: ♀, Hutton's collection, Canterbury Museum; ♂, No. 1232, D. M.

Genus SPHAEROPHORIA St. Far. et Serv. (1828).

Species of slender body; eyes bare; 3rd antennal joint circular; abdomen elongate, rather narrow and restricted at base in the male; wings somewhat elongate.

S. ventralis n. sp.

A small slender black fly with 4 tawny spots on the abdomen; legs, pleurae, and face yellow; apex of wing clouded.

♂. Eyes bare, approximated on vertex, which, together with the ocellar triangle, is shiny blue-black; ocelli vermilion; upper part of front shiny blue-black, the anterior margin of this colour being trifid, the central fork largest, the lateral ones short and extending to orbits; lower front pale yellow, somewhat greenish and widening to lunule, which is dark yellow; front and vertex clothed with short and erect brownish hairs. Antennae short and tawny; 3rd joint circular with a black upper edge; arista black. Face vertical below antennae but produced above oral margin (fig. 10); bare and shiny pale yellow with a dark-brown central spot on protuberance; cheeks pale yellow and clothed with short pale hairs; occiput black; proboscis and palpi dark yellow.

Dorsum of thorax shiny black-brown, tawny on alar calli and on each side posterior to transverse suture; humeri, pleurae, and halteres tawny; scutellum brown; legs tawny, the posterior tarsi somewhat darker. Wings more or less blunt at apex; a brown cloud at apex between veins R_1 and R_{4+5} ; articulation tawny; wings otherwise clear and iridescent; squamae tawny. (Plate XLVII, fig. 6.)

Abdomen (fig. 13) shiny blackish-brown, elongate and narrow, somewhat narrowed basally; 1st segment with a tawny tuberculate swelling on each side of scutellum; 3rd and 4th segments each with a pair of elongate dark-yellow spots directed upward from the sides toward the centre; genitalia brownish-yellow.

♂. Length, 6.5 mm.

Holotype: No. 273, D. M.

Habitat.—Purakanui.

* *Trans. N.Z. Inst.*, vol. 52, p. 34 (1920)

Genus CHEILOSIA Panz. (1809).

Rather robust flies, more or less rectangular in outline; wings sometimes not extending beyond abdomen; eyes bare or hairy, holoptic or dichoptic in the male, broadly dichoptic in the female; head more or less rectangular in profile; face with a prominent central knob; antennae of species described below lying flat on face, the 3rd joint orbicular; legs at times peculiarly haired, the anterior and posterior tibiae and tarsi sometimes broadened.

Two of the four new species described below—*C. howesii* and *C. leptospermi*—are represented one by a female and the other by a male; they are singularly similar in many respects—so much so that they might readily be taken for the one species. However, I think there is sufficient reason to separate them, mainly on the character of the anal angle and alula of the wing, which are so markedly different in the two. The other two species are quite distinct.

TABLE OF SPECIES.

1	{	Anal angle of wing nearly right-angled; alula long and narrow, reaching almost to anal angle; abdomen dull bronzy blue, the apical segment brilliant cupreous	<i>leptospermi</i> n. sp.
		Anal angle and alula normal	2
2	{	Thorax and abdomen blue-black, the latter broadest across the middle; length, 9 mm.	<i>cunninghami</i> n. sp.
		Thorax bronzy or cupreous; abdomen rectangular	3
3	{	Thorax shiny bronze; abdomen violet-blue and comparatively short; length, 6 mm.	<i>howesii</i> n. sp.
		Thorax brilliant cupreous; abdomen dull blackish-brown and rather elongate; length, 10 mm.	<i>ronana</i> n. sp.

C. leptospermi n. sp.

A rather small, short-bodied, immaculate fly with the anal angle and alula of the wing well developed.

♂. Eyes bare, holoptic, somewhat coppery; long black erect hairs on vertex; front and ocellar triangle bronzy, the former clothed with silvery or greyish hairs; lunular area shiny dark-blue, unusually large and semi-circular. Antennae short, broadly separated at insertion, and lying flat on face (fig. 14); 1st and 2nd joints bare, bronzy, together a little longer than the 3rd, which is short, orbicular, and reddish-brown; arista reddish-brown, short and thick but abruptly tapering apically. Face bronzy-black with a dense greyish pubescence and scattered silvery hairs, the protuberances bare; face (fig. 15) descending slightly forward beneath antennae and thence abruptly outward to the prominent knob, below which at the oral aperture is a truncated protuberance which, in front view, is cup-shaped and divided by a perpendicular median ridge; below this, on each side, the lower angles of the face are rounded, swollen, and somewhat descending; oral margin shiny blue-black; a shiny blue-black stripe running diagonally forward from the cheeks at oral margin on to the face between the orbits and anterior oral margin; cheeks blue-black clothed with a greyish tomentum and scattered silvery hairs; occiput shiny deep blue; proboscis and palpi blackish-brown.

Thorax and scutellum shiny cupreous, the sternopleurae rather blackish blue; dorsum clothed with short white hairs, becoming longer on the meso- and ptero-pleurae; pleurae with a greyish reflection. Legs purplish-black and coppery, somewhat shiny; the tibiae, which are rather swollen apically, are brown at extremities; knees brown; on the underside of the anterior

tibiae apically, and the pro- and meso-tarsi is a brush of long brown hairs, the protarsi being elongated (fig. 16); on the middle legs this brush is represented by short stiff hairs; posterior tibiae yellowish-brown on basal part, strongly bent and swollen apically (fig. 17); posterior tarsi with a short golden brush beneath, the protarsus not quite half the length of the whole joint and somewhat swollen; anterior and middle femora with scattered greyish hairs; all the tibiae and tarsi clothed with short hair-like bristles; the onychotarsi bristly, a few of the bristles being long and delicate; claws large; pulvilli with numerous papillae; posterior coxae with silvery hairs. Wings (fig. 2) slightly tinged with brown; veins and stigma brown; cross-veins slightly clouded; alula long and narrow, reaching almost to

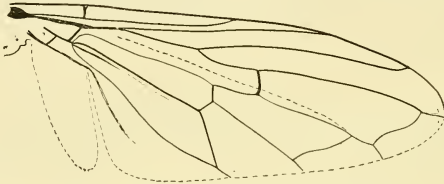


FIG. 2.—*Cheilosia leptospermi* n. sp.: wing.

anal angle which is strongly developed and in line with posterior margin of the wing, squamae and anti-squamae opal-white, the former fringed with long rigid white hairs and the latter with short ones; halteres brown.

Abdomen rectangular in outline, clothed with scattered short white hairs lengthening along the sides of 1st and 2nd segments; each segment transversely rugose; apical segment brilliant cupreous, the remainder dull bronzy-blue; genitalia brownish.

♂. Length, 6.5 mm.

Holotype: No. 524, D. M.

Habitat.—Wallacetown (A. Philpott).

C. howesii n. sp.*

A rather small robust shiny bronze fly with no colour-pattern.

♀. Eyes bare, comparatively small, broadly dichoptic; ocellar triangle black clothed with a few hairs; front broad, shiny bronze, clothed with conspicuous dark-brown hairs which are longer and more erect across vertex; lunular area large and deep blue. Antennae short, lying flat on face, well separated basally; 1st and 2nd joints black, somewhat longer than the 3rd, and destitute of hairs or bristles; 3rd joint orbicular though rather quadrangular, dark reddish-brown with a lighter reflection caused by a minute pubescence; arista short, stout, dark reddish-brown, and minutely pubescent. Face shiny, deep blue, clothed with a silvery pubescence and scattered short silvery hairs except on protuberances; in profile (fig. 18) straight but running forward to tubercle, below which the oral margin projects as a pointed protuberance; lower facial angles rounded at oral cavity; cheeks shiny bronzy-black but greyish in some lights and clothed with silvery hairs; occiput black with erect greyish hairs above; proboscis blackish-brown, palpi brown.

* Named after Mr. W. G. Howes, of Dunedin.

Thorax and scutellum clothed with short greyish hairs; shiny bronze, the pleurae with a greyish reflection and the scutellum at times somewhat bluish. Legs robust; blue-black, the knees brownish; the tibiae rather thickened apically and clothed with short and scattered silvery hairs; anterior tibiae with minute, erect, bristle-like hairs along lower side; anterior and middle protarsi with a brush of short bristles beneath, the former joint rather short; posterior protarsi somewhat elongate and with a short golden brush beneath; all the femora sparsely haired and the tarsi minutely bristly, a bristle at the angle of each joint being rather conspicuous; anterior and middle tarsi flattened. Wings comparatively short, very slightly tinged, the veins and stigma brown; anal angle and alula normal; squamae and anti-squamae brown, the former fringed with long brown hairs and the latter with short ones; halteres pale brown.

Abdomen elongate-quadrangular, not transversely rugose, dull violet-blue, and clothed with minute and scattered silvery hairs which form a longer fringe on each side of the basal segment.

♀. Length, 6 mm.

Holotype: No. 879, D. M.

Habitat.—Kevis (W. G. Howes).

C. cunninghami n. sp *

A moderate-sized blue-black fly with no colour-pattern and superficially resembling *Xylota montana* and *Lepidomyia decessum*.

♀. Eyes bare, widely dichoptic, comparatively small; front clothed with strong black hairs, broad, widening anteriorly, shiny blue-black, a transverse furrow across the middle; ocellar triangle black clothed with a few delicate hairs; lunular area black, produced slightly between the base of the well-separated antennae, which lie on the face; 1st and 2nd antennal joints black, the former fringed with greyish hairs, the latter clothed with very short and scattered ones; 3rd joint orbicular though rather elongate, brownish but black in some lights; arista black, minutely pubescent, short and stout but tapering apically. Face broad, shiny blue-black with a greyish reflection, and clothed with strong black hairs; face, in profile, somewhat convex below antennae but running forward to the abrupt knob just beneath the 3rd antennal joint (fig. 19); anterior oral margin produced below facial knob and surrounded by a three-sided right-angled furrow; a small swelling on each side of oral process; lower angles of face swollen and produced downward, the oral margin thus descending anteriorly (fig. 19); cheeks clothed with strong brown and black hairs; occiput swollen along orbits, blue-black but brownish in some lights, and clothed with greyish hairs, which become long and erect at vertex; proboscis shiny blue-black to brown; palpi long and styliform, black at base but brownish apically.

Thorax and scutellum shiny blue-black, clothed with grey or silvery hairs, which become longer on the pleurae. Wings tinged with brown, veins brown, stigma pale brown; the arculus arising from medius; squamae and anti-squamae blackish-brown, pale beneath; the former with a long and the latter with a short fringe of pale-brown hairs; halteres brown. Legs blue-black, the apex of femora and base of apex of tibiae brownish;

* Named after Mr. G. H. Cunningham, of the Government Biological Laboratories.

femora clothed with long brownish to black hairs; tibiae with a short and stiff greyish vestiture, the anterior and posterior—particularly the former—swollen apically; tarsi golden-brown beneath, caused by a brush of short rigid hairs; anterior tarsi (fig. 21) very much broadened and shortened, the protarsus being very little longer than the following joint; posterior protarsi elongate and slightly thickened; claws apically black, otherwise reddish-brown.

Abdomen blue-black, rather shiny; elongate but broader across the middle; clothed with delicate grey hairs, longer on the sides, and with indistinct rigid black ones towards the sides of each segment; surface indistinctly transversely rugose.

♀. Length, 9 mm.

Holotype: No. 1233, D. M.

Habitat.—Day's Bay.

C. ronana n. sp.

A medium-sized somewhat hairy elongate fly with a brilliant coppery thorax and brownish-black abdomen.

♂. Eyes bare, dichoptic; ocellar triangle black, clothed with short brownish-yellow hairs; front somewhat swollen, dull blue-black but with a greyish reflection, densely clothed with blackish hairs; lunular area semi-circular and black; 1st antennal joint blue-black; 2nd joint brownish; 3rd ovate, brick-red, darker in some lights, and with pale-grey reflections; arista black. Face more or less vertical (fig. 20); shiny greenish-black; clothed with a dense greenish-grey tomentum except on the protuberances—one below end of antennae and the other above oral margin; cheeks greenish-black, clothed with short silvery hairs, which extend over the blue-black occiput particularly along the orbits.

Thorax and scutellum brilliant cupreous, with blacker reflections; clothed with short yellowish hairs, longer on the scutellum and pleurae and forming a distinct fringe on the dorsum across the scutellar suture. Wings slightly tinged with brown, stigma pale brown, veins brown; vein M_1 angulated and with a stump from this point into cell R_5 (fig. 22)*; squamae and anti-squamae tinged with pale brown; halteres golden-yellow. Legs brownish-yellow with an indistinct fuscous spot in the centre of femora and tibiae; posterior tibiae and protarsi somewhat swollen; tarsi, except the anterior and middle protarsi, blackish-brown; posterior tarsi with a golden reflection beneath caused by the vestiture.

Abdomen elongate, the sides parallel; clothed with short silvery hairs, longer at the sides; dull blackish-brown (though somewhat reddish), except the shiny greenish-black basal segment; the sides of each segment narrowly cupreous; a pair of indistinct greyish spots, caused by the vestiture, and seen best with the unaided eye, across the anterior margin of 3rd and 4th segments.

♂. Length, 10 mm.

Holotype: No. 1239, D. M.

Habitat.—Rona Bay (E. H. Atkinson).

* Frequently too much importance has been placed upon the presence or absence of stump veins; I have frequently found that a stump, though present on the wings of some specimens of the same species, may be absent in others; the wings of the one specimen may even vary in this respect.

Genus SYRPHUS Fabr. (1775).

In this genus the face, which is vertical, though slightly concave, and gently produced to the knob, is yellow, with or without a darker median stripe, or altogether melanoid; the antennae are short, the 3rd joint being circular or somewhat oval; the dorsum of the thorax may be immaculate or margined with yellow; the scutellum is completely or partially yellow, altogether blackish or at times diaphanous; the pleurae may have yellow markings; the legs are rather slender, the femora not being thickened; in the wings the *r-m* cross-vein is considerably before the middle of cell 1st M_2 , and the vein R_{4+5} is straight, or practically so, above cell R_5 ; the abdomen is elongate, somewhat ovate, narrow with parallel sides or restricted along the middle segments; it is usually spotted or banded with yellow or, as in two of the new species, immaculate.

Of the seven species recorded below, three are new. The resemblance of *S. ropalus* Walk. to *Paragus pseudo-ropalus* n. sp. has already been noted, while in a former work* the writer has pointed out that *S. obesus* Hutton = *S. viridiceps* Wied., an Australian species.

TABLE OF SPECIES.

1	Abdomen immaculate, either blue-black or orange-brown ..	2
	Abdomen spotted or banded with yellow	3
	Face blue-black, golden-pruinose; abdomen orange-brown; length of ♀, 11 mm.	<i>harrisi</i> n. sp.
2	Face tawny, with a median blue-black stripe extending broadly along oral margin (fig. 24); abdomen deep shiny blue; length of ♀, 6 mm.	<i>flavofaciens</i> n. sp.
3	Abdomen spotted and with 2 transverse bands, one on the 3rd and the other on the 4th segment	4
	Abdomen not banded but with pairs of spots on segments ..	5
	Robust species; abdomen broad, bands occupying most of 3rd and 4th segments; antennae ochreous; pleurae with a tawny transverse band	<i>viridiceps</i> , ♂.
4	Slender species; abdomen narrow, bands confined to anterior half of 3rd and 4th segments; antennae brownish-black; no band on pleurae	<i>ropalus</i> .
	Front without yellow markings	<i>novae-zealandiae</i> .
5	Anterior half of front partly or completely ochreous	6
	Robust species; abdominal spots large, occupying greater part of segments; pleurae with a tawny band	<i>viridiceps</i> , ♀.
6	Slender species, particularly the males; abdominal spots not large; no band on pleurae, at most mesopleurae partially yellow	7
	Face with a blackish central stripe; abdomen of ♂ with 4 pairs of oblique spots but not especially narrowed along middle; length, 6-9 mm.	<i>ortas</i> .
7	Face without a blackish central stripe; at most with a darker yellow marking; abdomen of ♂ very narrow, with 3 pairs of oblique spots, and restricted along the middle; length, 10-10.5 mm.	<i>hudsoni</i> n. sp.

S. harrisi n. sp.† (Plate LII, fig. 2.)

♀. A rather large fly, with a brilliant cupreous thorax, orange-brown abdomen, and wings tinged with tawny.

Eyes bare; ocelli pale yellow; front blue-black, clothed with scattered yellow hairs which are confined more toward the upper orbits; lower frontal

* Diptera of the Kermadec Islands, *Trans. N.Z. Inst.*, vol. 46, p. 126 (1914).

† Named after Mr. J. R. Harris, of Ohakune.

orbits broadly yellow, due to a pubescence which extends over the facial orbits; antennae orange-red, 3rd joint oval with a black upper edge; arista reddish-black; a tawny spot above the root of each antenna. Face slightly concave between antennae and knob; blue-black, but golden-pruinose on each side of knob and upwards beneath antennae; clothed also with short and scattered golden hairs; mouth-parts brownish-yellow; occiput depressed, black but yellow-pruinose and shortly haired along orbits.

Thorax brilliant cupreous; humeri tawny but whitish in some lights; alar angles to wings tawny; a narrow pale-yellow stripe from humeri to wings; halteres tawny. Wings large, with a tawny tinge except basally; stigma orange-red, veins brown; nodule of vena spuria connected by a cross-vein with vein R_{4+5} (fig. 23). Legs tawny, the anterior tibiae and posterior protarsi very slightly thickened.

Abdomen elongate-quadrangular, the sides almost parallel; brownish-yellow with indistinct and irregular blackish markings.

♀. Length, 11 mm.

Holotype: No. 1201, D. M.

Habitat.—Okakune (J. R. Harris); Karori (G. V. Hudson).

S. flavofaciens n. sp.

♂. A medium-sized dark-blue elongate fly with no abdominal markings but with a yellow spot on each side of thorax.

Eyes bare, somewhat approximated on vertex; front shiny dark-blue, clothed with short brownish hairs; two crescentic incisions on lunular area behind roots of antennae, which are brown in colour but darker basally; 3rd joint ovate; arista black. Face (fig. 24) tawny with a greyish-yellow tomentum and a median shiny blue-black stripe which is continued broadly along oral margin over the cheeks and produced upward at a point to facial orbits anterior to cheeks; posterior angle of oral cavity tawny on each side and beneath; occiput blue-black, posterior orbits with short silvery hairs; proboscis and palpi blue-black, the labella tawny.

Thorax shiny blue-black, clothed with short black hairs; a tawny area on the meso- and ptero-pleurae; scutellum blue-black with a bronzy tinge and tawny apex. Legs brownish-black, the femora testaceous basally; anterior legs somewhat lighter in colour. Wings clear or slightly tinged with brown; stigma brown, veins brownish-yellow; squamae and anti-squamae white; halteres brownish-yellow.

Abdomen elongate, shiny deep-blue, slightly narrowing at base, and clothed along sides with short and delicate whitish hairs; genital segments brownish.

♂. Length, 7 mm.

Holotype: No. 525, D. M.

Habitat.—Wallacetown (A. Philpott); Dunedin (W. G. Howes).

S. hudsoni n. sp.*

A medium-sized fly with yellow spots on the abdomen.

♂. Eyes bare, narrowly dichoptic, angulated half-way down the front, where there is a transverse groove, posterior to which the front is narrow and bronzy but anteriorly widens and is tawny on each side of a narrow

* Named after Mr. G. V. Hudson, of Karori.

median greenish-blue stripe restricted in the middle (fig. 25); front clothed with brownish hairs; ocellar triangle elongate and situated forward from vertex. Antennae orange-yellow, with a broad dark-brown upper edge; 3rd joint oval; arista blackish-brown. Face minutely hairy, abruptly receding to oral margin below knob (fig. 26); general colour pale yellowish-green, with a darker, somewhat yellowish median stripe and a blackish reflection along orbits to lower eye-angle; cheeks yellow; mouth-parts brown; occiput black, posterior orbits silvery.

Dorsum of thorax shiny greenish-black, clothed with short pale hairs; a short yellow stripe on each side between humerus and wing; pleurae greenish-black, the metapleurae somewhat pale yellowish; scutellum ochreous but darker basally and clothed with tawny hairs. Wings clear though faintly tinged distally; stigma and veins brown; vena spuria, which arises at origin of R_{2+3} , has a stump from lower side of the nodule; just behind cell 1st M_2 , vein M is slightly sinuated, and arising from proximal end of this sinuation is an indistinct vein-like structure which, arising vertically, turns abruptly forward parallel to vein M and crosses into cell 1st M_2 (fig. 27); halteres tawny. Anterior and middle legs ochreous, the posterior pair brown except for the ochreous basal half of the femora.

Abdomen black, clothed with delicate brownish marginal hairs; elongate and narrow, slightly restricted along each side; 2nd, 3rd, and 4th segments each with a pair of oblique ochreous spots (figs. 28); genital segments brownish.

The female differs from the male in the elongate ovate abdomen, which has a pair of more transverse and pointed spots on the 2nd, 3rd, 4th, and 5th segments.

♂. Length, 10 mm. ♀. Length, 10.5 mm.

Holotype: No. 1234, D. M.

Habitat.—Karori (G. V. Hudson).

S. novae-zealandiae Macq. (Plate XLVII, fig. 7.)

S. novae-zealandiae Macquart, *Dipt. Exot., Suppl.* 5, p. 115 (1885); Hutton, *Trans. N.Z. Inst.*, vol. 33, p. 40 (1901); *Cat. Dipt. N.Z.*, p. 44 (1881); Miller, *Trans. N.Z. Inst.*, vol. 42, p. 230 (1910); *l.c.*, vol. 46, p. 126 (1914). *S. ortas*, Hudson, *Man. N.Z. Ento.*, p. 56 (1892).

A medium-sized fly with bronzy-black thorax and black abdomen spotted with orange-red, ochreous, cream, or white.

♂ Eyes holoptic and bare; front bronzy-green, vertex black, both clothed with erect black hairs, those on the front appearing as a tuft in profile; lunular area shiny black, the anterior margin brownish; frontal orbits narrowly silvery in some lights. Antennae with the first 2 joints black, the 3rd brownish and oval; arista black with a very minute and scattered pubescence (fig. 29). Face shiny, rather bronzy, but covered with a dense greyish-brown pubescence and scattered black hairs; knob shiny blue-black, below which the oral margin is shiny brownish-black, this colour extending across the face to the orbits as an oblique band (fig. 30); remainder of oral margin greyish-brown, except posteriorly, where it is tawny or orange-red, which in some specimens may extend on to the occiput as a broad area; cheeks pale greyish-brown, silvery along the orbits, and clothed with white hairs; proboscis black with a brown labella;

palpi tawny, the apical joint with a long yellow bristle below and one apically; occiput black with a greyish reflection.

Dorsum of thorax shiny blackish-green to bronzy, with a vestitute of pale hairs; scutellum shiny bronzy but yellowish apically and clothed with long pale hairs; pleurae dull cupreous with darker and greyish reflections, and clothed with greyish to brown hairs. Anterior coxae elongate and black; anterior and middle legs brownish, the base of the femora brownish-black, the apex of the tarsi fuscous; posterior legs brownish-black, particularly the tarsi, the knees lighter; all the femora with pale hairs beneath on basal half. Wings clear, veins and stigma brown; a supernumerary humeral cross-vein sometimes present; the supernumerary vein arising from vein M and already noticed in *S. hudsoni* (fig. 27) is quite distinct and vein-like in some specimens of *S. novae-zealandiae*; halteres pale brown.

Abdomen (fig. 34) somewhat rectangular, the sides more or less parallel; dull velvet-black, with a pair of ochreous, cream, orange-red, or white elongate and transverse spots on the 2nd, 3rd, and 4th segments. The variation in the colour of these spots is dependent to a great extent upon the age of the fly; it is frequently found that some of the spots on the one individual may be of one tint and others lighter or darker; newly-hatched specimens are semitransparent, the darker colours developing with age. The abdomen is clothed with short and stiff black hairs, with a fringe of silvery ones on each side of basal segment. The genital segments and genitalia are black, and their form is shown in fig. 32.

♀. Eyes dichoptic; front and vertex shiny blue-black; antennae black, 3rd joint with a reddish area on lower side at base; a yellowish-brown area at articulation of antennae. Face with a central shiny blue-black stripe; an oblique band running from anterior oral margin to orbits as in male; otherwise face, cheeks and oral margin are brick-red, ochreous, or grey (fig. 31).

Thorax clothed with pale hairs; dorsum brilliant cupreous-green; pleurae and scutellum as dorsum, but the former with dull-black and greyish reflections and the latter diaphanous greenish-yellow apically; the colour of the scutellum may be lighter or almost totally black.

Abdomen (fig. 35) rather ovate, with a pair of spots, which vary in colour as in the male, on 2nd, 3rd, 4th, and 5th segments.

♂ and ♀. Length, 9–11 mm.

Plesiotype: No. 1235, D. M.

Habitat.—Abundant throughout New Zealand, the Kermadec and Chatham Islands; Hutton states that it has been recorded from Polynesia. The adults are on the wing from spring to autumn in the southern parts of the South Island, but in Nelson, Marlborough, and the warmer parts of the North Island they are to be found in varying numbers throughout the year. The eggs are usually laid singly upon plants, and the larvae (Plate XLVIII, fig. 1) feed upon caterpillars and aphids.

S. ortas Walker.

- S. ortas* Walker, *Cat. Dipt. Brit. Mus.*, p. 585 (1849); Hutton, *Cat. Dipt. N.Z.*, p. 43 (1881); *Trans. N.Z. Inst.*, vol. 33, p. 41 (1901).
S. rectus Nowicki, *Mem. Krakauer Akad. Wissen.*, 2, p. 24 (1875);
 Hutton, *Cat. Dipt. N.Z.*, p. 44 (1881).

A medium-sized fly with a brilliant bronze-green or blue-green thorax, yellow scutellum, and yellow-spotted brown abdomen.

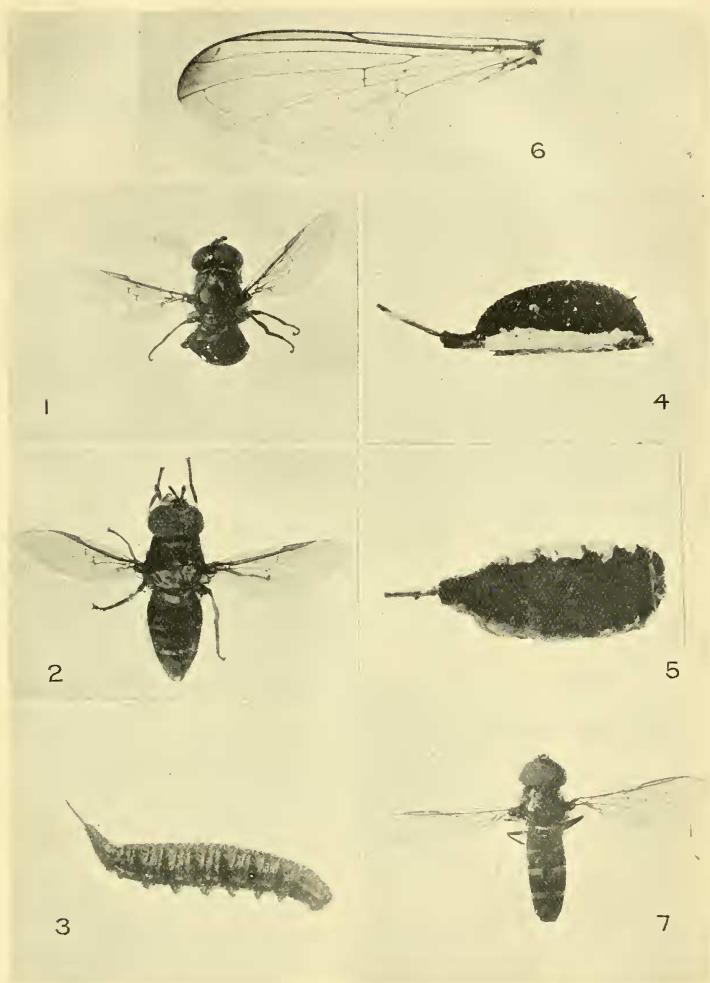


FIG. 1.—*Lepidomyia decessum* : adult female, showing abdomen in natural position. $\times 2\frac{1}{2}$.

FIG. 2.—*L. decessum* : adult male, showing abdomen straightened. $\times 3$.

FIG. 3.—*L. decessum* : larva. $\times 4$.

FIG. 4.—*L. decessum* : pupa, side view. $\times 4$.

FIG. 5.—*L. decessum* : pupa, dorsal view. $\times 4$.

FIG. 6.—*Sphaerophoria ventralis* n. sp. : wing. $\times 8$.

FIG. 7.—*Syrphus norae-zealandiae* : adult male. $\times 2\frac{1}{2}$.



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2



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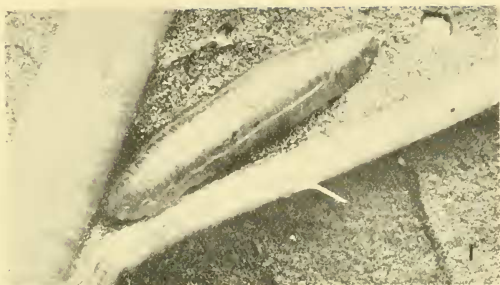


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6

FIG. 1.—*Syrphus norae-zealandiae* : larva on leaf. $\times 6$.
 FIG. 2.—*S. ropalus* : larva, side view. $\times 4$.
 FIG. 3.—*S. ropalus* : empty pupa, from above. $\times 5$.
 FIG. 4.—*S. viridiceps* : adult male. $\times 3$.
 FIG. 5.—*Platycheirus lignudus* n. sp. : adult female. $\times 4$.
 FIG. 6.—*Melanostoma fasciatum* eggs on a grass-head. Magnified.



2



3

FIG. 1.—*Melanostoma fasciatum* larva on a leaf. $\times 8$.
FIG. 2.—*Xylota montana* n. sp : adult female. $\times 4$
FIG. 3.—*Tropidia bilineata* : adult female. $\times 3$.



FIG. 1.—*Helophorus antipodius*: adult male, $\times 4$.
FIG. 3.—*H. hochstetteri*: adult female, $\times 2\frac{1}{2}$.

FIG. 2.—*Melolota cingulata*: adult female, $\times 3$.
FIG. 4.—*Helophorus antipodius*: adult female, $\times 3\frac{1}{2}$.

♀. Eyes bare; front brilliant cupreous, with a brilliant pink transverse reflection in front of ocellar triangle, and clothed with a sparse brown pile causing a pale-brown reflection. Face greenish-yellow, this colour extending upward on each side to a point along frontal orbits; face clothed on each side with a short yellow pile; a median blue-black stripe extending from lunular area to mouth (fig. 33); cheeks and oral margin ochreous, the former clothed with a short yellow pile which extends over the occiput. Antennae short, brownish-yellow with darker markings particularly along the upper and front edges of the short rather truncated 3rd joint; arista dark brown; mouth-parts brown; occiput greyish-black, but in some cases tawny below, this colour extending from oral margin.

Thorax brilliant bronzy-green with a vestiture of short delicate hairs; a pale-yellow area on each side between the wing and humerus, and extending in certain lights as pale brownish-yellow over the mesopleurae; scutellum amber-yellow, clothed with delicate pale hairs. Wings clear and iridescent, the stigma brownish-yellow, veins tawny; halteres amber-yellow. Femora ochreous, but brownish distally, the posterior pair distinctly so; tibiae pale-brownish, the posterior darker centrally; tarsi brown.

Abdomen linear but somewhat broader anterior to centre (fig. 36); shiny dark-brown; delicate pale hairs on sides of 1st and 2nd segments; a pair of distinct transverse linear ochreous spots on 2nd, 3rd, and 4th segments, and a pair of indistinct brownish spots on 5th segment.

♂. Smaller and more slender than ♀; thorax shiny bronzy-black and scutellum clothed with short and scattered black hairs; the abdomen is more hairy, elongate and narrow, and the spots are broader and somewhat oblique; genitalia tawny.

♂. Length, 6 mm. ♀. Length, 9 mm.

Plesiotype: No. 1236, D. M.

Habitat.—Throughout New Zealand from August to May. The colour-markings of this species may be darker or lighter.

S. ropalus Walker.

S. ropalus Walker, *Cat. Dipt. Brit. Mus.*, p. 593 (1849); Hutton, *Cat. Dipt. N.Z.*, p. 44 (1881); *Trans. N.Z. Inst.*, vol. 33, p. 41 (1901); Miller, *N.Z. Jour. Agric.*, vol. 21, p. 335 (1920); Miller and Watt, *Trans. N.Z. Inst.*, vol. 47, p. 278 (1915).

A medium-sized fly with the face and sides of thorax yellow, 2 pairs of abdominal spots and 2 transverse bands, one on the 3rd and the other on the 4th segment. This species bears a superficial resemblance to *Paragus pseudo-ropalus* n. sp.

♀. Eyes bare; vertex and upper part of front bronzy-black to purple, lower half greenish-yellow, with a narrow median tawny stripe seen in some lights; the whole thinly clothed with short black hairs; 1st and 2nd joints of antennae tawny and with black bristles, the 2nd joint somewhat darker apically; 3rd joint ovate but rather blunt at apex, brownish-yellow but blackish-brown over upper edge, and clothed with minute greyish pubescence, which also covers the blackish-brown arista; lunular area tawny. Face greenish-yellow, gently produced to brown knob, above which is an indistinct median blackish-brown stripe; anterior oral margin brownish, the lower angles of face rather tawny; oral margin and cheeks

yellowish-green, the latter and the face clothed with short pale hairs; occiput tawny in ground-colour but with blackish and greyish reflections and clothed with delicate pale hairs; proboscis and palpi brownish-yellow.

Dorsum of thorax clothed with short brownish hairs; shiny bronzy and broadly margined with yellowish-green on each side anterior to wings; humeri yellowish-green; alar regions rather brownish; scutellum yellowish-green to tawny, thinly clothed with short black hairs; pleurae clothed with pale hairs, greenish-yellow except for anterior margin of mesopleurae and upper and lower parts of sternopleurae (that is, sternopleurae with a longitudinal band of greenish-yellow). Femora tawny, brownish to black apically, particularly the posterior pair; clothed with short black bristle-like hairs apically, but with delicate pale hairs below basally; anterior and middle tibiae tawny with minute black apical bristles and clothed with short tawny hairs; posterior tibiae brownish-yellow and apically brownish to black; clothed with short, bristle-like black hairs; tarsi with a short golden brush and minute black bristles beneath, otherwise clothed as posterior tibiae; anterior and middle tarsi tawny, with darker reflections, the posterior brownish to black. Wings clear, the stigma slightly clouded, veins pale-brown; squamae tawny; halteres tawny to greenish-yellow.

Abdomen (fig. 37) shiny brownish-black, clothed with short blackish hairs, longer and tawny along sides of 1st and 2nd segments; 1st segment tawny; 2nd and 5th with a pair of broad tawny or orange spots; 3rd and 4th each with a tawny or orange transverse band, the posterior margin of each band being deeply notched and the anterior somewhat sinuated; posterior angles of 5th segment indistinctly tawny; 6th segment rather brownish on each side.

The male is smaller and more slender than the female, the markings are darker, and the abdominal spots more oblique; the genitalia are tawny.

Pre-adult Stages.—The full-grown larva (Plate XLVIII, fig. 2) measures 12.5 mm. in length; it is greenish-yellow in colour, and the soft corrugated skin is semitransparent, showing the organs within the body; on the sides of each segment is a short leg-like projection, while on the terminal segment a pair of approximated, testaceous respiratory organs project upward. The larvae are to be found in considerable numbers living in company with the larvae of *L. decessum* in the gum-fluid which collects in the leaf-bases of the Maori flax (*Phormium tenax*), where they feed upon the larvae of a Chironomid, and to a less extent upon those of *L. decessum*. After nightfall they frequently leave the gum-fluid and crawl about the leaves of the *Phormium* in search of flax-grubs (larvae of *Xanthorhoe praefectata*). They are also to be found upon the leaves of the cabbage-tree (*Cordyline australis*), where they attack the larvae of *Venusia verruculata*. Pupation takes place on the dead flax and cabbage-tree leaves; the pupa (Plate XLVIII, fig. 3), which measures 8.5 mm. in length, is club-shaped and elongated, being strongly arched anteriorly but more or less flattened and tapering posteriorly; it is of a light-brown colour, with a series of longitudinal dark-brown stripes running the full length of the body; a pair of respiratory organs project from the posterior end.

♂. Length, 6 mm. ♀. Length, 8 mm.

Plesiotype: No. 1237, D. M.

Habitat.—Throughout New Zealand. The adults are very abundant from August to April in the vicinity of flax-bushes and cabbage-trees.

S. viridiceps Wied.* (Plate XLVIII, fig. 4.)*S. viridiceps* Wied., Miller, *Trans. N.Z. Inst.*, vol. 46, p. 126 (1914).*S. obesus* Hutton, *Trans. N.Z. Inst.*, vol. 33, p. 41 (1901).

This species is very abundant in Australia, and is fairly common in the North Auckland Peninsula as far north as Parengarenga; it is also common on the Kermadec Islands.

Both sexes are robust; eyes bare, holoptic in male; face orange or greyish-yellow with a darker median stripe; upper part of front in female shiny black, this colour forming a median stripe along the orange-yellow lower front. Antennae orange-brown. Dorsum of thorax shiny purplish-black, margined with tawny on each side; pleurae with a tawny transverse band; thorax of male thickly haired, but sparsely so in the female; scutellum tawny, orange- or brownish-yellow; legs tawny; femora blackish-brown proximally; tarsi fuscous. Wings clear; halteres tawny.

Abdomen ovate and broad; shiny black between the tawny markings; basal segment somewhat bluish; 2nd, 3rd, 4th, and 5th segments mostly occupied by tawny or orange-red markings, forming a pair of large spots on the 2nd and 5th segments and a broad band on the 3rd and 4th segments in the male; in the female the markings consist of a pair of large spots narrowly interrupted in the middle of the 2nd to 5th segments.

♂. Length, 8 mm. ♀. Length, 8.5 mm.

Genus MELANOSTOMA Schiner.

Eyes bare, holoptic in male; antennae short, 3rd joint oval; arista pubescent or bare. Face slightly produced to knob, black or metallic in ground-colour and frequently pruinose. Thorax black or metallic, usually brilliant; legs normal, yellow or fuscous. Abdomen with or without yellow markings, ovate in female but more or less rectangular in male.

TABLE OF SPECIES.

Abdomen with yellow markings	<i>fasciatum</i> .
Abdomen immaculate	<i>apertum</i> .

M. fasciatum Macq.

Plesia fasciata Macquart, *Dipt. Exot., Suppl.* 4, p. 461, pl. 14, fig. 15 (1880). *Melanostoma fasciatum* Hutton, *Trans. N.Z. Inst.*, vol. 33, p. 42 (1901); *Cat. Dipt. N.Z.*, p. 45 (1881).

A very common, rather small fly, readily recognized by the bright-yellow markings of the abdomen.

♂. Eyes bare, holoptic; vertex black, clothed with very short black hairs; ocelli orange; front shiny brownish-black clothed with short black hairs. Antennae (fig. 41) somewhat elongate; 1st joint black; 2nd black basally, reddish-yellow apically; 3rd tawny, sometimes rather reddish, oval, pubescent, and with a black area at apex extending over upper edge to base of arista, which is reddish-brown and pubescent; lunular area with a reddish-yellow spot on each side at base of antennae. Face shiny bronzy-black, greyish-pruinose, sparsely clothed with silvery hairs; its

* I am indebted to Mr. W. W. Froggatt, Government Entomologist, New South Wales, for checking the identification of this species.

outline shown in fig. 38; cheeks black with a greyish reflection; proboscis and palpi black, the latter sometimes brownish; occiput black with greyish reflections.

Thorax brilliant bronze, with a tawny pubescence on dorsum; scutellum brilliant blue-black. Legs tawny, sometimes fuscous, with tawny knees. Wings clear, iridescent; veins and stigma brown; halteres pale yellow.

Abdomen elongate, rectangular, the sides almost parallel; shiny blackish-brown, but mostly occupied by the tawny or orange-red spots on the 2nd, 3rd, and 4th segments (fig. 39); the spots on the 2nd segment are the smallest, those on the 3rd and 4th occupy the whole of each segment except for a narrow median stripe and a band across the posterior margin which widens at the sides. The genitalia are tawny, the structure of the genital segments being shown in fig. 43.

♀. Eyes dichoptic; front and vertex shiny black and clothed with short black hairs; a narrow silvery reflection along frontal orbits; a narrow transverse brownish band constricted in the middle and followed by a suture to be seen in some lights across the middle of front. Antennae altogether tawny except for a blackish apical area.

Thorax shiny bronzy-black; scutellum shiny black; the whole clothed with a tawny pubescence. Legs ochreous, the posterior tibiae distally and the tarsi fuscous.

Abdomen (fig. 40) ovate, shiny blue-black with a pair of ochreous spots on the 2nd, 3rd, 4th, and 5th segments, the last pair transverse, the remainder rather dome-shaped, those of the 2nd and 3rd segments narrowing to the sides; apex of retracted segments tawny.

The intensity of the abdominal spots varies according to location and age: in the milder parts of the country they are more tawny, but in warmer localities they are of a rich orange-red.

The female deposits her yellowish eggs (Plate XLVIII, fig. 6) in pairs or sometimes singly upon plants infested with aphides and lepidopterous larvae. The larvae of *M. fasciatum* are yellowish and semitransparent with a darker medio-longitudinal stripe; at the anterior end is a smooth shiny area. Plate XLIX, fig. 1, shows one of the larvae at rest on the underside of a rape-leaf. Large numbers of aphides and the larvae of the diamond-back moth (*Plutella maculipennis*) are destroyed by this syrphid. The pupae are short, club-shaped, and brownish, and may be found attached to the underside of leaves frequented by larvae.

♂ and ♀. Length, 6 mm.

Plesiotype: No. 1238, D. M.

Habitat.—Throughout New Zealand, from spring to autumn.

M. apertum Hutton.

M. apertum Hutton, *Trans. N.Z. Inst.*, vol. 33, p. 42 (1901).

Hutton's type, the only specimen as yet known, has lost the 2nd and 3rd joints of one antenna and the 3rd of the other. Owing to the length of the existing 2nd joint, it is doubtful if this species belongs to *Melanostoma*; however, it is retained here for the present until complete specimens are procured.

A small shiny blue-and-black fly with tawny legs and no colour-pattern.

♀. Eyes bare, dichoptic; front and face shiny bronzy-black with a greyish tomentum; ocelli yellowish, the ocellar triangle with delicate erect

hairs; 1st and 2nd antennal joints black with a brownish or greyish tomentum; the 2nd joint elongate, reaching toward the facial prominence; outline of face as in *fasciatum*; mouth-parts withdrawn, black but tawny apically.

Thorax and scutellum shiny bronzy-black, sparsely clothed with delicate silvery and brown hairs; the ptero- and sterno-pleurae rather brownish. Wings faintly tinged with brown, iridescent, the stigma somewhat brownish; articulation ochreous. As Hutton has pointed out, the venation agrees with that of *fasciatum*; halteres ochreous. Legs ochreous, but the posterior pair much darker though brownish at the joints; coxae black.

Abdomen dark blue, rather shiny, immaculate; elongate, broad in the middle and narrowing basally and apically.

♀. Length, 6 mm.

Holotype: Hutton's collection, Canterbury Museum.

Habitat.—Christchurch (Hutton).

Genus PLATYCHEIRUS St. Far. et Serv. (1828).

The species of this genus are elongate and narrow; in colour black, blue, or metallic, with no yellow markings but sometimes hoary spots on the abdomen; antennae situated well above middle height of head; face more or less vertical and produced to prominence about middle of head, thence receding to oral margin below; orbito-facial groove present; eyes bare, holoptic in the male; anterior tarsi broadened in the female, the legs of the male peculiarly haired.

TABLE OF SPECIES.

- | | |
|--|-------------------------|
| (a.) Thorax shiny blue-black; face deep blue; 3rd antennal joint black with a greyish reflection; abdomen blue-black with indistinct greyish areas on 2nd, 3rd, and 4th segments | <i>lignudus</i> n. sp. |
| (b.) Thorax bronzy-black; face black; 3rd antennal joint orange-red; abdomen blue-black without greyish areas except in some lights at anterior angles of 2nd, 3rd, and 4th segments of ♂ .. | <i>clarkei</i> n. sp. |
| (c.) Thorax black; face pale yellow with a black stripe; abdomen black with oblique white spots; halteres emerald-green .. | <i>atkinsoni</i> n. sp. |

P. lignudus n. sp. (Plate XLVIII, fig. 5.)

A shiny blue-black narrow-bodied fly with indistinct greyish areas on the abdomen.

♀. Eyes bare, dichoptic; vertex and front shiny deep blue with a dense vestiture of black hairs; lunular area black. Antennae (fig. 44) situated high up on head; black and rather elongate, with a greyish reflection due to pubescence, which is minute on 1st and 2nd joints; 3rd joint elongate oval; arista black and pubescent. Face shiny blue-black clothed with scattered grey hairs and a greyish tomentum above orbito-facial groove; outline shown in fig. 42; oral margin shiny blue-black and sparsely clothed with erect greyish hairs; cheeks blue-black, silvery in some lights, and clothed with grey hairs; occiput blue-black with a silvery reflection and a dense vestiture of grey hairs along orbits and behind vertex; mouth-parts blue-black to brownish.

Thorax and scutellum shiny blue-black, clothed with a dense vestiture of greyish-brown hairs. Legs brownish-black but tawny at apex of femora and base of tibiae, the former clothed with delicate hairs, the latter and the tarsi covered with very short, golden to brownish, stiff hairs; anterior

tibiae rather thickened distally, their tarsi distinctly broadened (fig. 45); anterior protarsi produced on each side as a process; mesotarsi broadest, the following joints shortening and narrowing; on lower side of anterior tarsi are golden bristle-like hairs; middle tibiae with a row of short blackish apical bristles beneath. Wings clear, stigma brownish, veins brown but paler basally; halteres pale brown.

Abdomen elongate and rather ovate (fig. 46), shiny blue-black with indistinct areas of pale-greyish tomentum and hairs on 2nd, 3rd, 4th, and 5th segments, arranged as in figure; sides of abdomen with short white hairs.

♀. Length, 7.5–8.5 mm.

Holotype: No. 557, D. M.

Habitat.—Central Otago and Moutere Inlet (D. M.); Waitati (C. E. Clarke).

P. clarkei n. sp.*

This species resembles *lignudus* in general form and colour.

♂. Front shiny black with a tinge of green and clothed with black hairs; eyes holoptic; antennae minutely pubescent, causing a greyish reflection; 1st and 2nd joints black; 3rd ovate, orange-red with a black upper edge and tip. Outline of face as in *lignudus* but the prominence not so pronounced; face shiny black, greyish-pruinose above orbito-facial groove, with golden reflections, and clothed with black hairs; cheeks black with black to brownish hairs; proboscis black, the labella orange-brown; occiput black with a greyish reflection, the orbits clothed with greyish hairs.

Thorax and scutellum shiny bronzy-black, thinly clothed with blackish hairs. Wings slightly dusky but clearer basally; stigma smoky; halteres brownish. Coxae blackish-brown and rather hairy; femora blackish-brown, golden-pruinose and brownish beneath basally, tawny apically; clothed with long, delicate, scattered, golden hairs, and a row of small black bristles along lower side, longer on posterior femora; tibiae tawny but brownish along the middle, the anterior pair with a distinct fringe of golden and black bristle-like hairs along lower side; posterior pair thickened distally; tarsi black with a golden or brownish reflection and clothed with short bristle-like hairs; the posterior and anterior tarsi with a distinct golden brush of short rigid hairs beneath; anterior tarsi slightly broadened, the posterior, particularly the protarsi, more so.

Abdomen elongate, the sides parallel; deep blue, dull; clothed with short silvery hairs, long and delicate along the margins of 1st and 2nd segments; a cupreous area sometimes silvery owing to arrangement of hairs, and seen only in some lights, at anterior angles of 2nd, 3rd, and 4th segments; surface of abdomen transversely rugose; genitalia brownish-yellow.

♀. Differs from ♂ in the following characters: 3rd antennal joint mostly black, the orange-red being restricted to lower half of joint. Dorsum of thorax shiny brownish-black; scutellum shiny blue-black. Anterior tibiae and tarsi thickened; the epi-, meso-, and meta-tarsi of anterior legs short and broad, the onychotarsi small (fig. 49).

Abdomen slightly ovate, with an olive-green tinge in some lights, and without the cupreous areas at anterior angles of segments.

♂ and ♀. Length, 8 mm.

Syntype: No. 1230, D. M.

Habitat.—Rotorua and Te Wairoa (D. M.).

* Named after Mr. C. E. Clarke, of Dunedin.

P. atkinsoni n. sp.*

♂. A slender black fly with 4 pairs of white spots on the abdomen, and emerald-green halteres.

Head in profile decidedly flat above, the front curved down to antennae (fig. 47); eyes bare, holoptic, the posterior margin concave; ocellar triangle black and clothed with blackish hairs; ocelli vermilion; front pale tawny, clothed with black hairs, a short median brownish stripe extending on to front from confluence of eyes; lunular area testaceous with a blackish spot on the middle, bi-crescentic. Antennae broadly separated, inserted in pits well up on head; 1st and 2nd joints blackish-brown with a greyish reflection; 3rd joint ovate, brick-red with a blackish upper margin and covered by a silvery tomentum; arista black. Face as shown in fig. 47; a broad black median stripe, narrowing at oral margin, which it narrowly borders; on each side this stripe merges into testaceous, which in turn merges into the pale yellowish-green of face; insertion of each antennae surrounded by a pale-yellow area; a brownish-black spot extends from oral margin in front of cheeks to a point on lower eye-margin; face greyish-pruinose on each side and between and immediately below the antennae, and clothed with short tawny hairs except on blackish areas; orbito-facial groove pronounced; cheeks rather swollen, black with a greyish reflection, and clothed with short whitish hairs; occiput black, the orbits clothed with short white hairs; mouth-parts black, but the labella orange-brown.

Thorax shiny black, clothed with silvery hairs more scattered on the dorsum, on each side of which is a greyish area extending from a point at humerus, widening into incision of transverse suture and thence narrowing to the wing; scutellum dull brownish-yellow, margined with black and clothed with blackish hairs; the meso-, ptero-, and upper part of sternopleurae greyish-pruinose and clothed with long silvery hairs; remainder of pleurae black; halteres with brown shafts and large emerald-green heads. Wings clear, the stigma orange-brown, veins black; squamae opal-white and fringed with silvery hairs. Legs slender, the posterior tibiae and protarsi slightly thickened; anterior and middle tibiae sparsely clothed with stiff brownish hairs, orange-brown but lighter at the apex; posterior coxae black, greyish-pruinose, and clothed with silvery hairs; posterior femora blackish-brown, greyish in some lights, rather tawny at apex, and sparsely clothed with silvery hairs which are denser below distally; anterior and middle tibiae orange-brown, darker in some lights, the latter with minute black apical bristles below; posterior tibiae blackish-brown, paler basally and with a greyish reflection; anterior and middle tarsi blackish-brown, clothed with short silvery hairs, the former rather broadened, the protarsi of the latter with minute bristles beneath; posterior tarsi black with short golden hairs beneath, the protarsi somewhat thickened; all the tarsal joints bristly at angles; claws orange-brown with black tips; pulvilli orange-brown.

Abdomen (fig. 58) elongate, narrow, parallel-sided, shiny black, sparsely clothed with short silvery hairs which become longer at sides particularly on basal segments, but shortening and not extending to apex of 4th segment, their place being taken by small black bristles; 2nd, 3rd, 4th, and 5th segments each with a pair of oblique white spots, those of 2nd segment truncated above, and of the 5th somewhat yellow; genitalia greyish-yellow.

♂. Length, 9 mm.

Holotype: No. 1250, D. M.

Habitat.—Devil's Punch Bowl, Arthur's Pass (E. H. Atkinson).

* Named after Mr. E. H. Atkinson, of Wellington.

Subfamily MILESIINAE.

Vein R_{4+5} moderately or slightly curved into cell R_5 ; cross-vein $r-m$ at or beyond the middle of cell 1st M_2 .

Genus XYLOTA Meigen (1822).

The chief characters by which the following species is placed in this genus are: vein R_{4+5} moderately curved into cell R_5 ; cross-vein $r-m$ near middle of cell 1st M_2 ; face deeply dished beneath antennae; eyes bare; posterior femora broad and spinose beneath; body immaculate.

X. montana n. sp. (Plate XLIX, fig. 2.)

A robust medium-sized fly, blackish in colour and with no colour-pattern. It has some resemblance to *Lepidomyia decessum*.

Eyes bare, dichoptic in both sexes, but those of the male more approximated; ocelli orange-red; front and vertex shiny black with a silvery reflection due to pubescence and clothed with strong and rigid black hairs; frontal lunule brownish. Antennae black with a greyish tomentum; 3rd joint somewhat lighter in colour and more or less circular; arista black. Face deeply dished beneath antennae (fig. 48), being abruptly produced before descending almost vertically to the rather descending anterior oral margin, above which there is a slight prominence; face diagonally furrowed on each side, blue-black in colour but brownish to greyish pruinose above furrows; sparsely clothed above and on each side of produced portion with silvery hairs; lower facial orbits with erect greyish hairs; cheeks black with a silvery reflection particularly along the orbits, and clothed with whitish to brown hairs; occiput shiny blue-black with white hairs and greyish reflections; mouth-parts blue-black.

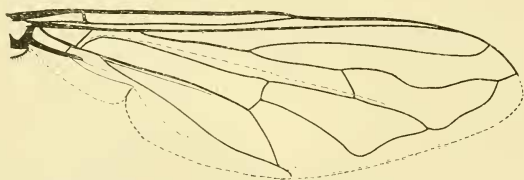


FIG. 3.—*Xylota montana* n. sp.: wing.

Thorax blue-black with indistinct stripes and a coppery reflection on the dorsum; sparsely clothed with delicate brownish and whitish hairs; humeri, margins of dorsum and alar regions greyish-pruinose in some lights; pleurae deep-blue and dull-greyish pruinose, the meso- and pteropleurae with a tuft of white hairs at their upper posterior angles; sternopleurae clothed with short black hairs; scutellum with long delicate greyish hairs. Wings (fig. 3) clear, stigma almost colourless, veins brownish-black; vein R_{4+5} moderately bent into cell R_5 ; cross-vein $r-m$ at the middle of cell 1st M_2 ; squamae and anti-squamae translucent, the former fringed with greyish branched hairs, the latter with short simple ones; halteres brownish with darker heads. Legs shiny blue-black; femora clothed with scattered greyish hairs, the posterior pair broadened and spinose beneath on distal half (fig. 55), there being a double row of short stout spines, weakening proximally, along the middle, and larger bristles

along the side to apex; anterior tibiae with short and stiff bristle-like golden hairs along lower side; similar hairs on lower side of all the tarsi; short black bristles at anterior angles of posterior tarsal joints.

Abdomen blue-black, sparsely clothed with short white hairs above and longer ones laterally; a slight tubercle at anterior angles of 1st segment; genitalia of ♂ shown in fig. 53.

♂. Length, 9 mm. ♀. Length, 10 mm.

Syntype: No. 1241, D. M.

Habitat.—Arthur's Pass (J. W. Campbell and G. V. Hudson)

Genus SYBITTA St. Farg. et Serv. (1828).

This genus is more or less allied to *Xylota*, but the posterior femora are very strongly thickened. No species, however, have been recorded from New Zealand beyond *S. oceanica* Macq., which Bigot is stated to have found also in Tahiti; since then it has not been recorded in the Dominion. Hutton* considered that it did not occur in New Zealand, but nevertheless I give the following description (apparently quoted from Macquart) from his *Cat. N.Z. Dipt.* (p. 42).

S. oceanica Macq.

S. oceanica Macquart, *Dipt. Exot., Supp.* 5, p. 112 (1854); Hutton, *Cat. N.Z. Dipt.*, p. 42 (1881).

“♀. Palpi small, black. Face rather concave, with silvery down and a black band in the middle. Anterior portion of front with white down, the rest shining black, prolonged into a point in front. The two first joints of the antennae brownish-testaceous; the third black, brown below. Thorax shining black the sides with white down. Abdomen dull black, the second segment with two yellow spots, shining, and reaching the anterior border; the third with two shining spots, the fourth entirely shining. Anterior and intermediate femora black, the extremity fulvous; the posterior pair entirely black; anterior and intermediate tibiae blackish, the base fulvous; the posterior pair black, with the knees and a ring in the middle fulvous; tarsi black the first joint fulvous. Poisers fulvous. Wings clear; veins normal.

“Length, 3 lines.

“Tahiti and New Zealand (Bigot).”

Genus TROPIDIA Meig. (1822).

It is doubtful to what genus the following species belongs; it was originally placed in *Milesia* by White† and later on retained therein by Walker; but since the cell R_1 of the wing is open it certainly does not belong to *Milesia*. Although there may be many excellent grounds for the establishment of a new genus upon this species, it is considered advisable, in the meantime at least, to retain it in the genus *Tropidia*, with which it coincides to a certain extent. The genus is characterized by the following: Eyes bare, holoptic at a point in the male, moderately dichoptic in the female; antennae short, 3rd joint rather rectangular; vein R_{4+5} gently curved into cell R_5 ; cross-vein $r-m$ beyond middle of cell 1st M_2 and oblique. Face without central knob, practically vertical to oral

* *Trans. N.Z. Inst.*, vol. 33, p. 95 (1901).

† Walker gives White as the author of this species, but there is no record to be found in the *Voy. "Erebus" and "Terror,"* to which Walker refers.

margin (which projects as a short snout in *bilineata*); posterior femora thickened and with an inferior triangular tooth near apex (in *bilineata* there is no triangular tooth, but a pronounced bristly swelling).

T. bilineata White. (Plate XLIX, fig. 3.)

Milesia bilineata White, *Voy. "Erebus" and "Terror" (?)*; Walker, *Cat. Dipt. Brit. Mus.*, p. 566 (1849); Hutton, *Cat. Dipt. N.Z.* p. 43 (1881); *Trans. N.Z. Inst.*, vol. 33, p. 40 (1901).

A large elongate blackish fly with a pair of stripes on the dorsum of the thorax.

♀. Eyes bare, moderately dichoptic; ocellar triangle elongate, blackish-brown with blackish-brown hairs; ocelli situated well forward; vertex and upper part of front dullish black; lunular area and lower part of front shiny black, the latter region brownish centrally; across the front and separating the black into two areas is a tawny band as shown in fig. 51. The front anteriorly is cone-shaped and prominent; in profile it descends steeply to the prominence, which is more or less horizontal, thus forming an angle with the more oblique upper part (fig. 52). Vertex and upper black area of front clothed with black hairs; the tawny band with yellow hairs. Antennae inserted close together at about middle line of head; black and comparatively large; 1st joint short and bristly, 2nd triangular, bristly and with a long inferior bristle, the anterior margin forming three blunt processes for the reception of the 3rd joint, which is orbicular, and greyish-pruinose; arista black and long, bare distally but minutely pubescent proximally. Face vertical though somewhat receding and projecting abruptly to form a short snout at oral margin (fig. 52); lower margin of

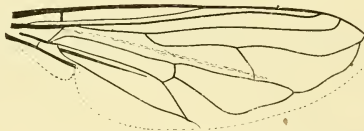


FIG. 4.—*Tropidia bilineata*: wing.

head almost horizontal but descending slightly at anterior oral margin; face with a shiny black median stripe and black areas along oral margin, otherwise tawny with brownish reflections and clothed with short delicate pale hairs; arrangement of colour-pattern shown in fig. 52; cheeks tawny and bearded with white hairs; an indistinct crescentic blackish reflection at lower corner of eye; a tawny spot on oral margin below cheeks; proboscis and palpi blackish-brown, the labella large and deeply bi-lobed; occiput greyish or whitish yellow with blackish reflections; somewhat swollen and hairy below, but slightly concave and bare above.

Thorax rectangular; dorsum with 3 black longitudinal stripes, the median one forked; except for black areas the dorsum is tawny, with greyish reflections; colour-pattern shown in fig. 54; alar regions clothed with long golden hairs, dorsum clothed with short brownish hairs; scutellum shiny blackish-brown and clothed with long brown hairs. In front of the mesopleurae the sides of the thorax are hollowed apparently for the reception of the anterior femora; pleurae for the most part black, golden-pruinose, the sternopleurae with a golden pubescent area above; the

meso-, petro-, and sterno-pleurae clothed with long golden hairs. Legs robust, black, and bristly, the bristles short and black on the coxae and femora, longer, and golden, in some lights, on the tibiae and tarsi; coxae greyish-pruinose with long grey hairs, the anterior coxae large and flattened; femora with long pale bristle-like hairs along posterior side, those of the posterior femora shorter; the latter are broadened and have a densely spinose protuberance on lower side near apex (fig. 59); tibiae densely clothed with golden bristle-like hairs most conspicuous distally; posterior tibiae broadened and curved; tarsi broadened, a conspicuous bristle at anterior angle of each joint and a stiff golden brush beneath; metatarsi short and crescentic, each anterior angle being produced along each side of the onychotarsi; pulvilli pale yellow; empodium styliform (fig. 56); claws large and tawny with black tips. Wings tinged with brown, the stigma darker; veins blackish-brown; cell R_1 open; vein R_{4+5} slightly curved into cell R_5 ; cross-vein *r-m* beyond middle of cell 1st M_2 (fig. 4); anal angle fringed with short delicate hairs; squamae opaque and densely fringed with long greyish branched hairs; anti-squamae fringed with short hairs; halteres tawny.

Abdomen (fig. 67) elongate and conical, about as wide as the thorax, margined with delicate yellow hairs and the surface clothed with short ones; black bristle-like hairs on 5th segment and fringing the posterior margin of 4th; general colour dullish black; on the 2nd, 3rd, and 4th segments are yellowish-white triangular spots, indistinct in some lights, and arranged as in fig. 67; 5th segment shiny black and transversely rugose; retracted segments yellowish-brown.

♂. Eyes contiguous at a point on front (fig. 50), which is whitish-yellow to golden; face as in ♀ but the lighter areas whitish; black median stripe apparent only in certain lights, but a permanent black area beneath antennae; a shiny black band on each side from antennae to eye-margin; occiput cinereous. Wings comparatively clear and shorter than the abdomen, which is narrow, the sides more or less parallel though broader basally; spots on 3rd segment elongated; genital segments (fig. 61) densely covered with bristle-like black hairs; claspers very long and narrow.

♂. Length, 13 mm. ♀. Length, 12–17 mm.

Plesiotype: No. 1070, D. M.

Habitat.—Wellington (E. H. Atkinson); Central Otago (W. G. Howes); Nelson (D. M.).

Subfamily ERISTALINAE.

Eyes of male holoptic or dichoptic, bare or hairy; face with a central protuberance; cell R_1 open or closed; cross-vein *r-m* beyond middle of cell 1st M_2 ; vein R_{4+5} strongly curved into cell R_5 ; posterior femora frequently broadened.

Genus MALLOTA Meigen (1822).

On account of the pilosity of the body, the bristly legs, the bristly swelling on lower side of the posterior femora, the tuberculate scutellum, the shape of the face, and the wing-venation, the following species, originally described by Fabricius, belongs neither to *Eristalis* nor *Helophilus*, in which genera it was placed by Hutton. In 1881 Hutton, though he retained it in *Eristalis*, remarked that "the shape of the legs puts this species into the next genus" (*Mallota*); but when reconsidering the matter in 1900 he decided in favour of the genus *Helophilus*.

M. cingulata Fabricius. (Plate L, fig. 2.)

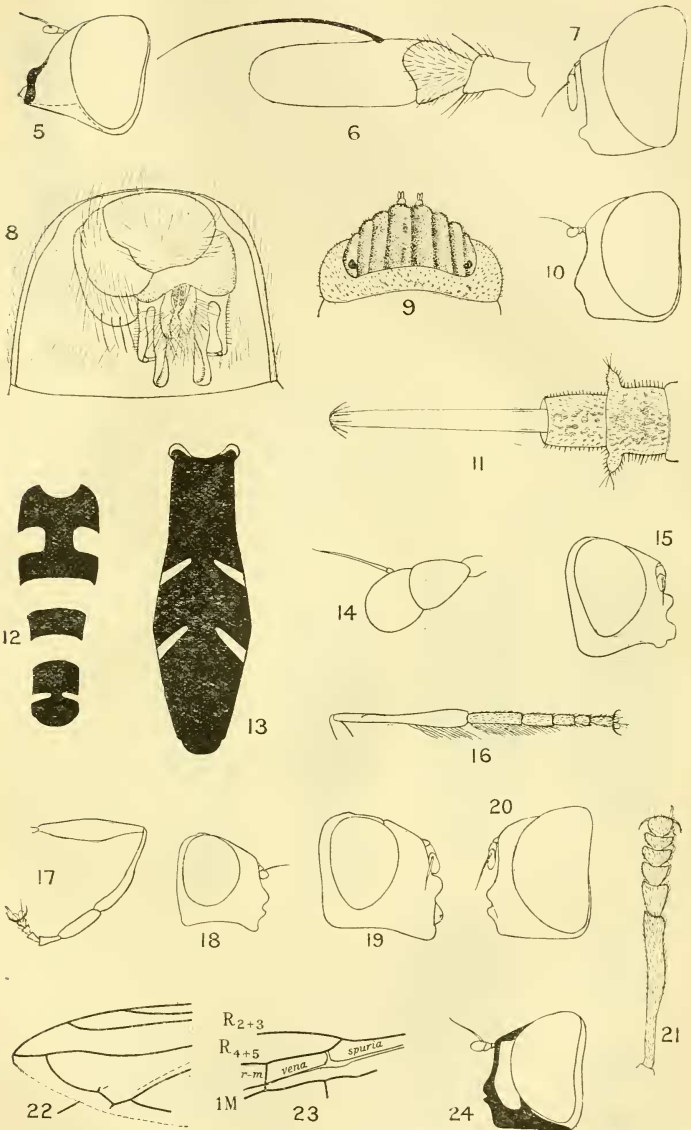
Syrphus cingulatus Fabr., *Syst. Ent.*, p. 767 (1775). *Eristalis cingulatus* Hutton, *Cat. Dipt. N.Z.*, p. 40 (1881). *Helophilus cingulatus* Hutton, *Trans. N.Z. Inst.*, vol. 33, p. 37 (1901).

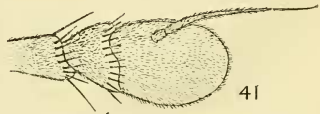
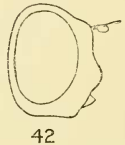
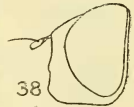
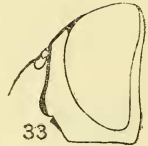
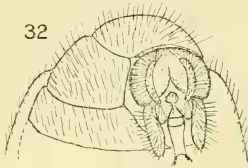
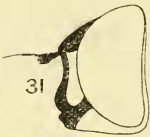
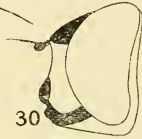
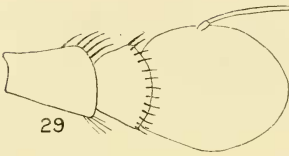
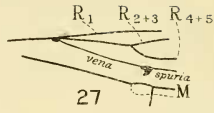
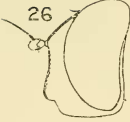
A large robust blackish pilose fly, with dense white hairs across base of abdomen.

♀. Eyes bare; vertex occupied by the large circular ocellar triangle, which is shiny ferruginous (sometimes brownish or greyish), except for a velvet-black area anterior to the posterior ocelli, and clothed with brownish-black hairs (fig. 57); front ferruginous, sometimes reddish-grey, a broad velvet-black band across the middle (its form shown in fig. 57); across the anterior margin of this band is a furrow, posterior to which the blackish pile, clothing the front, is erect but proclinate anterior to furrow; lunular area inclined to orange-yellow; 1st and 2nd antennal joints shiny black, the 3rd transversely oval, brownish-black but with a lighter reflection; arista orange-red but darker apically; a broad velvet-black band extending from eye to eye across roots of antennae and upper part of face beneath antennae (fig. 60). Face fulvous, darker in some lights; oral margin and lower part of face shiny black, as shown in fig. 60; a silvery area at lower eye-angle; a groove across face from eye to eye just beneath the protuberance; above this groove face clothed with delicate black hairs, but bare below; face deeply dished on upper half, thence produced to protuberance, below which it recedes to oral margin, which is descending; cheeks dull black, clothed with delicate black hairs; proboscis stout and black, the labella slightly reddish-black; occiput black with grey reflections, ferruginous from ocellar triangle to foramen and with a greyish area on each side of this.

Thorax robust, the dorsum, which is a rich velvet-black, clothed with short dense ferruginous pile; a pair of narrow greyish to white stripes narrowing posteriorly and ending abruptly before reaching the scutellum; humeri reddish-black with a tuft of black hairs; around the humeral suture and margining the lateral incisions of the transverse suture is an indistinct greyish stripe; in some lights there appears a broad chestnut stripe extending from the humeri to the scutellum; scutellum chestnut-brown to ferruginous, truncated apically, presenting a vertical posterior face, the upper

- FIG. 5.—*Paragus pseudo-ropalus* n. sp.: outline of head of male in profile.
 FIG. 6.—*Lepidomyia decessum*: antenna.
 FIG. 7.—*L. decessum*: outline of head in profile.
 FIG. 8.—*L. decessum*: genitalia of male.
 FIG. 9.—*L. decessum*: anterior end of larva, contracted.
 FIG. 10.—*Sphaerophoria ventralis* n. sp.: outline of head in profile.
 FIG. 11.—*Lepidomyia decessum*: siphon of larva.
 FIG. 12.—*Paragus pseudo-ropalus* n. sp.: diagram of abdomen of male.
 FIG. 13.—*Sphaerophoria ventralis* n. sp.: diagram of abdomen of male.
 FIG. 14.—*Cheilosia leptospermi* n. sp.: antenna.
 FIG. 15.—*C. leptospermi* n. sp.: outline of head in profile.
 FIG. 16.—*C. leptospermi* n. sp.: anterior tibia and tarsus of male.
 FIG. 17.—*C. leptospermi* n. sp.: posterior leg of male.
 FIG. 18.—*C. howesii* n. sp.: outline of head in profile.
 FIG. 19.—*C. cunninghami* n. sp.: outline of head in profile.
 FIG. 20.—*C. ronana* n. sp.: outline of head in profile.
 FIG. 21.—*C. cunninghami* n. sp.: anterior tibia and tarsus of female.
 FIG. 22.—*C. ronana* n. sp.: apex of wing.
 FIG. 23.—*Syrphus harrisi* n. sp.: diagram of vena spuria, showing cross-vein.
 FIG. 24.—*S. flavofaciens* n. sp.: outline of head in profile.





margin produced on each side as a tubercle, the dorsal surface densely clothed with a short ferruginous pile and the vertical surface with long and delicate brownish hairs. Pleurae black, clothed with black hairs but bare above the coxae; a reddish spot in some lights beneath the wings; anterior and posterior stigmata tawny to orange-red, and protected by a palisade of erect closely-set hairs. Wings clear but blackish-brown at the base; veins and stigma brown, the cubitus and medius paler basally; cell R_1 open; vein R_{4+5} deeply curved into cell R_5 ; cross-vein $r-m$ just beyond the middle of cell 1st M_2 ; vena spuria indistinct basally, connected with R_{4+5} by a distinct cross-vein (absent in some wings) from the nodule; supernumerary vein of cell Cu_2 very distinct and vein-like; squamae and anti-squamae blackish and translucent, the former fringed with long branched pale hairs, the latter with shorter hairs; halteres dark brown but reddish along lower edge. Legs blue-black and bristly; coxae clothed with black hairs; knees orange-yellow; underside, apex, and base of tibiae ferruginous or altogether golden; an orange-yellow area on lower side of posterior tibiae in the middle; anterior and middle femora with dense black hairs below; posterior femora (fig. 64) thickened and with a distinct swelling below, along which are distinct bristle-like hairs; anterior and middle tibiae less bristly than the posterior; the lighter area on lower side of posterior tibiae bare to the apex; tarsi orange-yellow to golden with darker reflections, each joint with short rigid bristles at anterior angles; pulvilli and claws pale tawny, the latter black at the tips; empodium styliform.

Abdomen (fig. 65) black, a shiny blue-black area at anterior margin on each side of 3rd and 4th segments, the apical segment shining and greyish in some lights; broadly ovate, broader than the thorax, clothed with delicate short black bristles, which become dense and stronger along the sides of the 2nd and 3rd segments; 1st segment and an elongate anterior area on each side of the 2nd segment densely clothed with long silvery hairs; when vestiture is removed these bearded areas are testaceous or tawny in ground-colour; a pair of triangular white discal spots and a pair of lateral circular ones on the 3rd and 4th segments and a pair of triangular white spots on the anterior angles of 5th segment as shown in fig. 65; from the sides of the 4th segment are long hairs, black except those from the lateral spots which are white; ventrally the abdomen is sparsely clothed with grey hairs; the basal sternite greyish and transversely rugose, the remainder blue-black; a pair of short orange-red styles project from apical segment.

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- FIG. 25.—*Syrphus hudsoni* n. sp.: dorsal view of head of male.
 FIG. 26.—*S. hudsoni* n. sp.: outline of head in profile.
 FIG. 27.—*S. hudsoni* n. sp.: part of venation, showing origin of vena spuria, &c.
 FIG. 28.—*S. hudsoni* n. sp.: diagram of abdomen of male.
 FIG. 29.—*S. novae-zealandiae*: antenna.
 FIG. 30.—*S. novae-zealandiae*: outline of head in profile of male.
 FIG. 31.—*S. novae-zealandiae*: outline of head in profile of female.
 FIG. 32.—*S. novae-zealandiae*: genitalia of male.
 FIG. 33.—*S. ortas*: outline of head in profile.
 FIG. 34.—*S. novae-zealandiae*: diagram of abdomen of male.
 FIG. 35.—*S. novae-zealandiae*: diagram of abdomen of female.
 FIG. 36.—*S. ortas*: diagram of abdomen of female.
 FIG. 37.—*S. ropalus*: diagram of abdomen of female.
 FIG. 38.—*Melanostoma fasciatum*: outline of head in profile.
 FIG. 39.—*M. fasciatum*: diagram of abdomen of male.
 FIG. 40.—*M. fasciatum*: diagram of abdomen of female.
 FIG. 41.—*M. fasciatum*: antenna.
 FIG. 42.—*Platycheirus lignudus* n. sp.: outline of head in profile.

♂. Eyes approximated at a point anterior to ocellar triangle, the orbits being strongly angulated; a naked area between the orbital angles and ocellar triangle, so that, in profile, there appears to be an upper and a lower tuft of hairs, the one on the ocellar triangle and the other on the lower front; 3rd antennal joint ferruginous; face darker than in ♀ and with darker reflections. Pleurae black with a greyish reflection, the hairs ferruginous just beneath the orange-red spot under wings. Bristles of hind-legs very distinct. Genital segments bristly, shown with the genitalia in fig. 62.

♂. Length, 13 mm. ♀. Length, 17 mm.

Plesiotype: ♂, No. 1240; ♀, No. 983, D. M.

Habitat.—Throughout New Zealand; uncommon in some parts, but very common in others—*e.g.*, Day's Bay, Wellington.

Genus HELOPHILUS Meigen (1822).

The genus *Helophilus* may be characterized as follows: Eyes bare and dichoptic in both sexes, though approximated in the male; face concave below antennae, but not dished, thence evenly convex; oral margin from the cheeks strongly descending (fig. 77); body not densely but rather inconspicuously haired; posterior femora thickened but not unusually so, and sometimes with a tooth below near the base; cell R_1 of wing open; vein R_{4+5} distinctly curved into cell R_5 ; cross-vein $r-m$ beyond middle of cell 1st M_2 . Species usually large and robust, including the largest of New Zealand Diptera; metallic in colour or blue and black with yellow stripes and spots.

Of the ten species already recorded from New Zealand, one has been herein placed in the genus *Mallota*; another, described by the writer in 1910 as new, is now found to be a synonym of one of Walker's species. Further, after a careful examination of Hutton's syntypes of *vincinus*, all of which are females, it is apparent that this species is a variety intermediate between the male and female of Schiner's *antipodus*. *H. antipodus* and *H. trilineatus* resemble each other closely in both sexes, and since only the male of *antipodus* and the female of *trilineatus* have until now been described—the former by Schiner and the latter by Fabricius—the males and females of both species have been grouped by Hutton and others under *antipodus* and *trilineatus* respectively. From the original descriptions by Schiner and Fabricius the sexes and species can, however, readily be separated, the main character being the presence in *trilineatus* (♂ and ♀) of an inferior tooth near the base of the posterior femora—“(femoribus) posticis unidentatis” (Fabr.)—the presence or absence of which was not noted by later authors.

FIG. 43.—*Melanostoma fasciatum*: genitalia of male.

FIG. 44.—*Platycheirus lignudus* n. sp.: antenna.

FIG. 45.—*P. lignudus* n. sp.: anterior tibia and tarsus.

FIG. 46.—*P. lignudus* n. sp.: diagram of abdomen of female.

FIG. 47.—*P. atkinsoni* n. sp.: outline of head in profile.

FIG. 48.—*Xylota montana* n. sp.: outline of head in profile.

FIG. 49.—*Platycheirus clarkei* n. sp.: anterior tibia and tarsus.

FIG. 50.—*Tropidia bilineata*: dorsal view of head of male.

FIG. 51.—*T. bilineata*: dorsal view of head of female, showing colour-pattern.

FIG. 52.—*T. bilineata*: outline of head in profile.

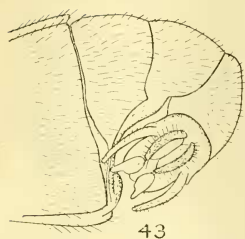
FIG. 53.—*Xylota montana* n. sp.: genitalia of male.

FIG. 54.—*Tropidia bilineata*: diagram of thoracic dorsum, showing colour-pattern.

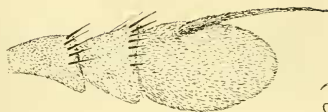
FIG. 55.—*Xylota montana* n. sp.: posterior femur.

FIG. 56.—*Tropidia bilineata*: onychotarsus and appendages.

FIG. 57.—*Mallota cingulata*: dorsal view of head of female, showing colour-pattern.



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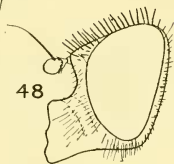
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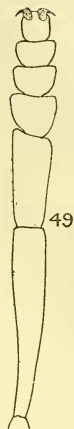
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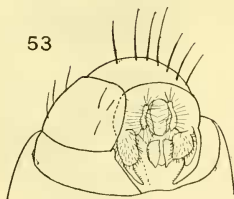
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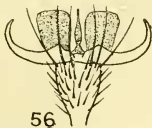
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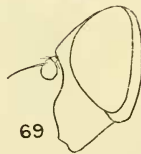
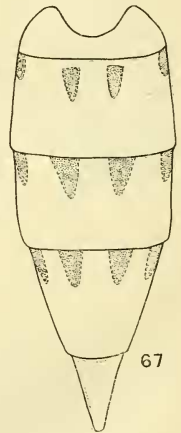
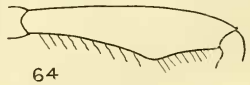
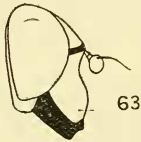
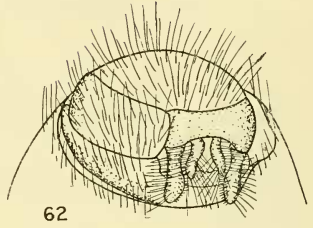
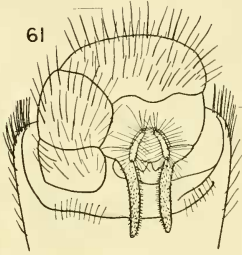
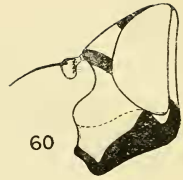
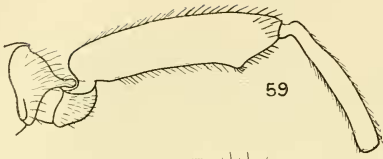


TABLE OF SPECIES.

1	{	Abdomen with yellow markings	2
	{	Abdomen without yellow markings	5
2	{	Abdomen distinctly clothed with golden hairs; the yellow markings indistinct; indistinct yellow markings on posterior legs	<i>ineptus.</i>
	{	Abdomen not distinctly clothed with yellow hairs; the yellow markings distinct; posterior legs distinctly marked with yellow	3
3	{	A pair of large spots on 2nd abdominal segment of ♀ and on 2nd and 3rd segments of ♂ (figs. 66 and 71)	4
	{	All the abdominal segments with dark-yellow markings and pale-yellow circular spots (fig. 82)	<i>cargilli.</i>
4	{	Median thoracic black stripe divided centrally by a long narrow yellow stripe (fig. 70); apex of posterior tibiae black; no tooth at base of posterior femora	<i>antipodus.</i>
	{	(a.) A pair of small tawny spots at anterior angles of 3rd abdominal segment	<i>antipodus</i> var. <i>vincinus</i> , ♀
	{	Median thoracic stripe not divided; apex of posterior tibiae yellow; a distinct tooth at base of posterior femora (fig. 74)	<i>trilineatus.</i>
5	{	Abdomen deep blue or violet-black	<i>hochstetteri.</i>
	{	Abdomen bronzy, bronzy-green, or cupreous	6
6	{	Abdomen bronzy or bluish-green, without dead-black areas; scutellum golden-brown basally, yellow apically	<i>campbellicus.</i>
	{	Abdomen cupreous, with indistinct dead-black areas; scutellum tawny	<i>chathamensis.</i>

H. antipodus Schiner. (Plate L, figs. 1, 4.)

- H. antipodus* Schiner, *Reise der Freg. "Novara," Dipt.*, p. 359 (1868).
 (♂) *H. antipodus* Hutton, *Trans. N.Z. Inst.*, vol. 33, p. 38 (1901).
 (♀) *H. trilineatus* Hutton, *l.c.* *Mallota antipoda* Hutton, *Cat. Dipt. N.Z.*, p. 40 (1881). (♀) *H. interruptus* Lamb, *Subant. Islds. N.Z.*, vol. 1, p. 133 (1909).

A large black fly with yellow stripes on the thorax and a pair of yellow abdominal spots in the female and two in the male.

♀. Eyes bare; vertex and upper part of front velvet-black (the anterior margin of this colour being sinuated) and densely clothed with erect black hairs; lower part of front yellowish-brown but with a darker reflection owing to vestiture of black hairs; a black or brownish-black transverse band from eye to eye, across antennae and extending very slightly on to front just behind the shiny dark-brown lunular area. Antennae velvet-black with a greyish reflection on the circular 3rd joint; arista black, though somewhat reddish apically; minutely pubescent basally. Face pale yellow, with a dense greyish-yellow tomentum and scattered yellow hairs except on a broad triangular median area over prominence; face moderately

- FIG. 58.—*Platycheirus atkinsoni* n. sp.: diagram of abdomen of male.
 FIG. 59.—*Tropidia bilineata*: posterior coxa, femur, and tibia.
 FIG. 60.—*Mallota cingulata*: outline of head in profile.
 FIG. 61.—*Tropidia bilineata*: genitalia of male.
 FIG. 62.—*Mallota cingulata*: genitalia of male.
 FIG. 63.—*Helophilus antipodus*: outline of head in profile.
 FIG. 64.—*Mallota cingulata*: posterior femur.
 FIG. 65.—*M. cingulata*: diagram of abdomen of female.
 FIG. 66.—*Helophilus antipodus*: diagram of abdomen of female.
 FIG. 67.—*Tropidia bilineata*: diagram of abdomen of female.
 FIG. 68.—*Helophilus campbellicus*: dorsal view of head of male.
 FIG. 69.—*H. campbellicus*: outline of head in profile.

concave beneath antennae, thence evenly convex; anterior oral margin notched and descending; a broad shiny blue-black band along oral margin extending from cheek and orbit to the anterior oral angle, where it narrows and is reflected upwards to follow the contour of the mouth (fig. 63); cheeks black, with a greyish reflection and greyish hairs; proboscis and palpi brownish-black; occiput greyish-yellow, with a slate-grey reflection and clothed with greyish hairs; the posterior orbits narrowly silvered for the most part, though narrowly black above.

Dorsum of thorax (fig. 70) clothed with a short yellowish-brown pile; 4 brownish-yellow stripes and 3 blackish-brown ones, the median being split anteriorly by a narrow yellow stripe; lateral black stripes with narrow projections around the posterior margin of the transverse suture; a narrow blackish-brown stripe on each side from humeri toward wings, but this stripe is indistinct in some lights; pleurae black in ground-colour, with a brownish or greyish tomentum and brownish-yellow hairs; anterior and posterior stigmata tawny or orange-yellow. Wings faintly tinged with brown, the veins and stigma brown; squamae and anti-squamae fringed with yellow hairs; halteres pale yellow; scutellum brownish-black or ranging to a lighter colour and clothed with black hairs and also a yellow pile basally.

Femora clothed with pale-yellow hairs, anterior and middle pair black but tawny at apex; posterior pair thickened, altogether black, clothed with short black hairs and rigid ones below; anterior and middle tibiae tawny with a fuscous band apically; posterior tibiae black on basal and apical third, tawny in the middle, and with an indistinct tooth below distally; all the tarsi tawny.

Abdomen (fig. 66) broad, ovate and pointed apically, clothed with short black hairs and a short yellow pile on the lighter areas; general colour shiny black; a pair of large more or less rectangular tawny or testaceous areas on 2nd segment, extending upward on each side over the posterior angles of the 1st segment; the 3rd and 4th segments have each a pair of indistinct greyish-black areas as shown in fig. 66; the retracted segments have a pair of tawny styles at the apex.

Variations.—The fuscous apical band of middle tibiae is sometimes indistinct; the abdominal tawny areas may be narrower or broader, and in some cases are reduced to a pair of somewhat circular spots on the 2nd segment.

H. antipodus var. vincinus ♀ Hutton.

Helophilus vincinus Hutton, *Trans. N.Z. Inst.*, vol. 33, p. 38 (1901).

This variety agrees with *antipodus* in all respects except that the tawny abdominal areas of the 2nd segment are larger and brighter and do not

FIG. 70.—*Helophilus antipodus*: diagram of thoracic dorsum, showing colour-pattern.

FIG. 71.—*H. antipodus*: diagram of abdomen of male.

FIG. 72.—*H. antipodus*: genitalia of male, ventral view.

FIG. 73.—*H. antipodus*: genitalia of male, side view.

FIG. 74.—*H. trilineatus*: posterior femur and tibia.

FIG. 75.—*H. cargilli*: genitalia of male, partial side view.

FIG. 76.—*H. trilineatus*: genitalia of male, ventral view.

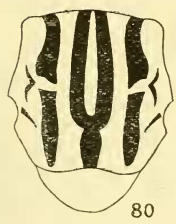
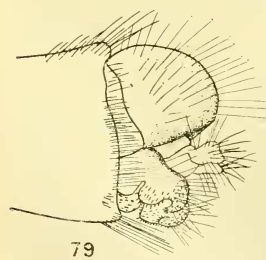
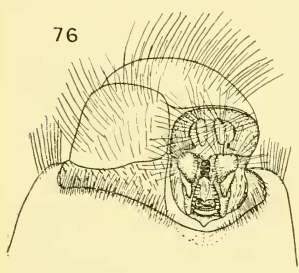
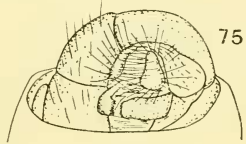
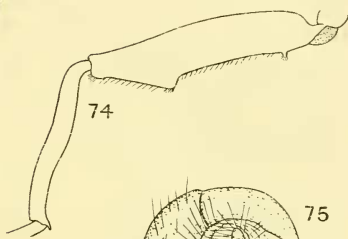
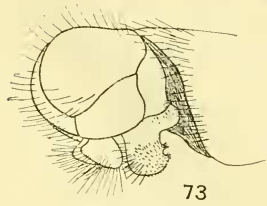
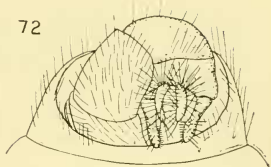
FIG. 77.—*H. trilineatus*: outline of head in profile.

FIG. 78.—*H. ineptus*: diagram of abdomen.

FIG. 79.—*H. trilineatus*: genitalia of male, side view.

FIG. 80.—*Myiatropa campbelli* n. sp.: diagram of thoracic dorsum, showing colour-pattern.

FIG. 81.—*Helophilus campbellicus*: diagram of thoracic dorsum, showing colour-pattern.



reach quite to the posterior margin except where they are continued round the posterior angles and extend for a short distance as a spot on each side along the anterior margin of the 3rd segment; the tawny vestiture, also, is more distinct and forms orange-yellow hair most conspicuous along the sides of 3rd and 4th segments; in some cases the tawny areas of the 2nd segment may be confluent with those of the 3rd over the posterior margin of the former segment; there may also be a small tawny spot at anterior angles of 4th segment. All the known specimens of this variety are from the Chatham Islands. The development of the abdominal spots and the conspicuous orange-yellow vestiture tend to show that this variety is intermediate between the ♀ and ♂ *antipodus*.

The male of *antipodus* differs from the female in the following: Vestiture of face longer; posterior femora rather broader; apical markings of anterior and middle tibiae less distinct; abdomen with a more conspicuous vestiture and the 3rd segment with a distinct pair of tawny spots (fig. 71); tawny areas of 2nd segment much broader than ♀, thus resembling those of var. *vincinus* ♀; the indistinct greyish-black spots of 4th segment present as in ♀. Genital segments (figs. 72 and 73) blue-black, the genitalia tawny.

♂. Length, 11–12 mm. ♀. Length, 13–15 mm. ♀. Length, 14 mm. (var. *vincinus*).

Plesiotype: No. 977, D. M. Syntypes: Var. *vincinus*, Hutton's collection, Canterbury Museum.

Habitat.—Throughout New Zealand; Campbell Islands; var. *vincinus*, Chatham Islands.

H. *trilineatus* Fabricius.

Syrphus trilineatus Fabr., *Syst. Ent.*, p. 766 (1775). *Eristalis trilineatus* Fabr., *Syst. Antl.*, p. 238; Wied., *Auss. Zweif.*, ii, p. 168 (1830). *Helophilus trilineatus* White, *Voy. "Erebus" and "Terror," Ins.*, pl. 7, fig. 19 (1874); Walker, *Cat. Dipt. Brit. Mus.*, p. 607 (1848); Hutton, *Cat. Dipt. N.Z.*, p. 41 (1881); *Trans. N.Z. Inst.*, vol. 33, p. 38 (1901).

A fly closely resembling *antipodus*, but more robust and much larger.

♀. Differs from *antipodus* in the following characters: Eyes more approximated, the black of upper front, vertex, and ocellar triangle permanent in all lights only on the triangle, the yellowish-brown of lower front being reflected over upper front and vertex, thus forming brownish mottlings in some lights; transverse band across antennae broader at frontal lunule; vestiture of front and vertex short; oral margin broadly margined with blackish brown, which is not upturned to any extent along anterior margin; oral margin not distinctly notched in front (fig. 77); cheeks cinereous to pale yellow and clothed with whitish hairs; occiput cinereous.

Median black stripe of thoracic dorsum not narrowly split anteriorly; upper two-thirds of pleurae cinereous-yellow; scutellum black in some lights but otherwise as in *antipodus*. Anterior and middle femora blue-black on basal half, otherwise orange-red; posterior femora altogether blue-black, very much broadened to a bristly prominence distally below, and with a stout spinose tooth below near base (fig. 74); around this tooth and distal prominence of posterior femora orange-red, and the lower side distinctly spinose; anterior and middle tibiae and all the tarsi orange-red; posterior tibiae orange-red but for a broad blue-black area at base, and with a distinct apical tooth below.

Tawny areas of 2nd abdominal segment encroaching more over the posterior angles of 1st segment; no indistinct greyish areas on 3rd and 4th segments, but the 3rd segment transversely rugose and brownish-yellow in the middle in some lights.

♂.° As *antipodus*, but the yellow of front is more brownish and of the face more greyish; cheeks with a denser beard; scutellum blue-black to brownish; legs differ from *antipodus* as do those of ♀; colour-pattern of abdomen paler. The points of difference in the genitalia of the two species is seen by comparing figs. 72 and 73 with 76 and 79.

♂. Length, 13 mm. ♀. Length, 17–19 mm.

Plesiotype: No. 1243, D. M.

Habitat.—Throughout New Zealand.

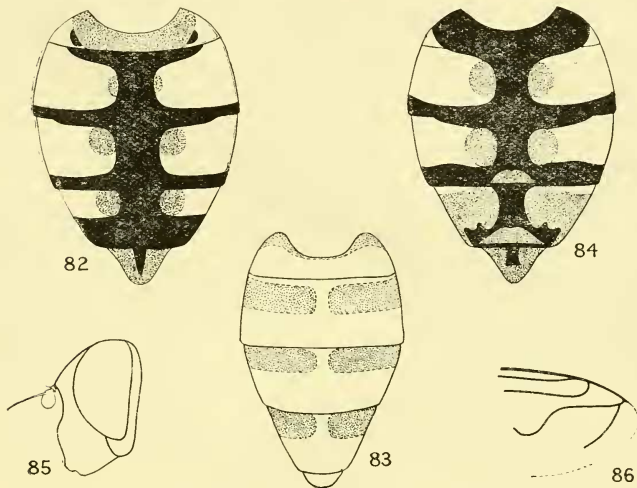


FIG. 82.—*Helophilus cargilli*: diagram of abdomen of female.

FIG. 83.—*H. campbellicus*: diagram of abdomen of male.

FIG. 84.—*Myiatropa campbelli* n. sp.: diagram of abdomen of female.

FIG. 85.—*Helophilus chathamensis*: outline of head in profile.

FIG. 86.—*Myiatropa campbelli* n. sp.: apex of wing, showing shape of R2+3.

H. cargilli Miller.

H. cargilli Miller, *Trans. N.Z. Inst.*, vol. 43, p. 126 (1911).

A large robust fly with striped thorax and orange-red abdomen intersected by black transverse bands and a median stripe, with pale-yellow circular spots on segments (fig. 82). Resembles closely *Myiatropa campbelli* n. sp. (compare fig. 82 with fig. 84).

♀. Eyes bare; ocellar triangle dark brown occupying whole of vertex and clothed with dark-brown hairs; front orange-brown in some lights with pruinose reflections and clothed as ocellar triangle; at times the front is yellowish-brown or the upper half distinctly brown, this colour being

produced forward as a point over the lower part; frontal lunule orange-brown and shiny; antennae and arista black. Face pale tawny with a golden tinge and clothed with tawny hairs; a shiny naked median area over prominence; oral margin broadly banded with shiny blackish-brown becoming lighter as it merges into the tawny of face above; face, in profile, gently concave beneath antennae; cheeks and occiput greyish-yellow, clothed with greyish hairs longer on the cheeks; proboscis and palpi blackish-brown.

Dorsum of thorax clothed with a short brownish pile; 3 blackish-brown and 4 greyish-yellow stripes arranged as in *antipodus*; pleurae greyish-black with yellowish areas in some lights and clothed with tawny hairs; scutellum orange-brown and clothed with brownish hairs; halteres tawny. Wings clear, the stigma hardly coloured; squamae yellowish and fringed with long branched hairs; anti-squamae fringed with shorter hairs. Legs hairy; tawny except for coxae, which are greyish, and for the trochanters, base of femora, the 1st four tarsal joints (except the posterior), and the posterior knees, which are blackish-brown; the onychotarsi inclined to tawny; posterior femora rather swollen and with delicate spines beneath on distal half; posterior tibiae inclined to fuscous apically; indistinct inferior, apical spines on anterior and middle tibiae; tarsi with minute black bristles beneath and a golden reflection in some lights, particularly on the posterior pair.

Abdomen (fig. 82) clothed with a short golden pile, longer at the sides; 1st segment orange-yellow laterally, otherwise greyish (except where covered by scutellum), a black spot on each side of greyish area; 2nd and 3rd segments orange-yellow but with an H-shaped black area, the sides of the H lying along the anterior and posterior margins and the cross forming a short median stripe; this black along the anterior margin does not reach to each angle of the segment; the anterior margin of the 3rd segment may be so covered by the overlapping posterior margin of the 2nd that the marking appears rather as an inverted T; 4th segment brownish-black but with an indistinct orange-yellow area on each side along anterior margin; 5th segment greyish-brown with a darker indistinct median stripe; on the 2nd, 3rd, and 4th segments is a pair of greyish spots, one on each side of median black stripe; these spots sometimes indistinct on 2nd segment; posterior margin of each segment rather brownish.

♂. Differs from ♀ only in the more pronounced character of the colour-pattern and in the broader posterior femora, their tibiae being blackish-brown distally. Genitalia shown in partial side view in fig. 75.

♂. Length, 12 mm. ♀. Length, 13 mm.

Holotype: No. 377, D. M.

Habitat.—Dunedin, Purakanui, and Wellington.

H. ineptus Walker

H. ineptus Walker, *Cat. Dipt. Brit. Mus.*, p. 608 (1849); Hutton, *Cat. Dipt. N.Z.*, p. 41 (1881); *Trans. N.Z. Inst.*, vol. 33, p. 39 (1901). *H. purehuensis* Miller, *Trans. N.Z. Inst.*, vol. 43, p. 125 (1911).

A large sombre-coloured fly, the abdomen clothed with yellow hairs and spotted toward the base.

♂. Eyes bare, dichoptic; ocellar triangle blackish-brown; upper part of front black, the lower greyish-yellow, the whole clothed with dark-brown

hairs separated into two areas by a bare transverse area across middle of front; lunular area dark brown and shiny. Antennae black, 3rd joint with a silvery reflection at base; arista bare and with a silvery reflection. Face tawny with greyish reflections and tawny hairs; a bare median tawny area; moderately concave beneath antennae; oral margin broadly margined with blackish-brown; cheeks and occiput greyish-black and clothed with greyish hairs longer on the cheeks; an indistinct tawny spot at lower eye-margin.

Dorsum of thorax inclined to bronzy posteriorly with 3 broad black stripes, otherwise greyish-brown though rather silvery along anterior margin behind the head; clothed with a short golden to greyish-golden pile; scutellum bronzy to brownish, lighter in colour apically, and clothed with long brown hairs; pleurae blackish-grey in ground-colour but with a greyish-yellow reflection and rather golden hairs; halteres yellowish-brown. Wings clear, the stigma barely coloured; squamae yellowish-grey and fringed as in preceding species. Legs thinly clothed with yellow hairs, the tarsi with closely-set short golden ones beneath; general colour bronzy-black, the anterior and middle knees and basal half of the tibiae brownish-yellow.

Abdomen (fig. 78) shiny, clothed dorsally with an orange-yellow pile; 1st segment bronzy; 2nd bronzy-black except for two triangular orange spots, one on each side, their bases being along the sides of the segment and extending over the posterior angles of 1st segment; 3rd and 4th segments bronzy with a dome-shaped black spot from the centre of the anterior margin; posterior margin of each segment with a narrow transverse black band broader at the sides and in the middle; genital segments greyish-pruinose in some lights.

♀. Vestiture of front not divided by a bare area; lower part of front with darker reflections; abdomen more conspicuously haired, the hairs inclined to form golden areas at the anterior angles of the segments.

♂ and ♀. Length, 11 mm.

Plesiotype: ♂, No. 322, D. M.; ♀, No. 317, D. M.

Habitat.—Dunedin, Wellington, and Auckland.

H. hochstetteri Nowicki. (Plate L, fig. 3.)

H. hochstetteri Nowicki, *Mem. Krakauer Akad. Wissen.*, ii, p. 23 (1875); Hutton, *Cat. Dipt. N.Z.*, p. 42 (1881). *H. latifrons* Schiner, *Reise der Freg. "Novara," Dipt.*, p. 359 (1868); Hutton, *Trans. N.Z. Inst.*, vol. 33, p. 39 (1901). *Mallota latifrons* Hutton, *Cat. Dipt. N.Z.*, p. 40 (1881). *Latifrons* preoccupied Loew, *Ber. Ento. Zeit.*, vii (1863).

A moderately large robust fly, recognized by the brilliant violet-blue to greenish abdomen and yellow-tipped scutellum.

♀. Eyes bare; front black with greyish reflections and clothed with dense black hairs; frontal orbits silvery in some lights; lunular area brilliant orange-yellow but margined with black posteriorly; 1st and 2nd antennal joints black; 3rd joint orange-yellow but margined with brownish-black along the upper and front edges; arista black. Face distinctly concave below antennae, the protuberance shiny brown, this colour descending as a broad bare area to anterior oral margin; oral margin bordered by shiny black; remainder of face dullish black and clothed with blackish hairs, silvery in some lights; facial orbits silvery; cheeks and occiput